JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The International Candle.

THE Memorandum as to Photometric Units which is published on another page of to-day's "JOURNAL," appears to have been issued first by the Bureau of Standards, Washington, on April 1 last. It is now issued in this country by the National Physical Laboratory, with a covering note stating that it was intended that the announcement contained in the Memorandum should have been made simultaneously in America, France, and Great Britain. Attention may here be directed to the importance of the announcement, which, in effect, makes the value of the English parliamentary sperm candle as definitely established by the Gas Referees in 1898—when they first prescribed the Harcourt 10-candle pentane lamp for use as the standard of light in the Metropolitan gas testing places—the accepted unit of light for most civilized countries, and for the electrical as well as the gas industry. It is true that Germany for the present will adhere to the Hefner unit; but a definite ratio between it and the Harcourt unit is now accepted by the National Physical or Electrical Laboratories of the four countries, so that photometric results recorded in terms of one unit will be readily convertible into terms of the other.

Reference to the reports issued from time to time by the National Physical Laboratory, and the American Gas Institute shows that both bodies as well as the Reichsanstalt obtained Harcourt lamps which had been carefully standardized in the laboratory of the Gas Referees by comparison with the original standards established there. It was found that the "candle" of the Harcourt lamp differed from the unit of light which had been established at the Bureau of Standards at Washington, though this unit had been intended to represent the English standard candle. It was, however, based on a ratio established by Liebenthal in 1893 between the Hefner unit and the English candle as adopted in Germany. It had been the custom in Germany, as is explained by Liebenthal in his text-book on photometry, to snuff or trim the wick of the English candle in photometric testings, in order to maintain the height of flame as nearly as possible constant—*i.e.*, at the arbitrarily chosen height of 45 millimetres. No such interference with, or disturbance of, the candle flame was, however, permitted in English photometry; and the candle burning thus undisturbed had a different and apparently slightly lower average value than when its wick was snuffed or trimmed according to the German convention. The Bureau of Standards at Washington, working through the Hefner unit and Liebenthal ratio, established standards for America, which were based on the English candle when used according to the German convention, instead of according to English practice. It thus came about that the American standard "candle" acquired a value higher by about 1·6 per cent. than the English standard candle which it was intended to reproduce. When, however, direct comparisons could readily be made through the medium of the Harcourt lamp, which preserves the value of the English sperm candle as specified in the Gas Acts, and certified for many years by the Gas Referees, the discrepancy was discovered. After mature consideration, and consultation with the interests primarily affected, the Bureau of Standards decided to alter its standard "candle" in order to bring it into agreement with the English standard candle and the *bougie decimale* of France, which by a happy coincidence were already in agreement.

The Bureau of Standards at Washington is, we believe, in a position to impose its standards on both the gas and electrical industries of America, and the National Physical Laboratory and the Laboratoire Central d'Electricité are the standardizing authorities generally acknowledged by the electrical industry in Great Britain and France. The unit thus already widely accepted shall, it is suggested, be known as the "International Candle;" and it is anticipated that in the near future it will also be accepted on behalf of other countries represented on the International Electrotechnical Commission. The gas industry of Great Britain may therefore rest well content that the English parliamentary sperm candle, the value of which has been defined and preserved by the Gas Referees, is, through the medium of the Harcourt lamp as standardized by them, in a fair way to become the unit of light for the gas and electrical industries throughout the world.

The Gaslight and Coke Company Bill.

EITHER wise counsels have prevailed with Mr. William Thorne, or he prudently appreciated that a heavy defeat awaited him if he persisted with his motion, having for its intention the strangling of the Bill of the Gaslight and Coke Company. Whichever of these reasons is the correct one, his opposition has ended in the most placid way, by the withdrawal of his motion last Thursday night, on which occasion he would have been bound to have presented his objections to the measure had he not taken the course he did. The Bill, he stated, would affect some thousands of gas consumers in West Ham; and the reason why his motion was put down was because there had been some disagreement between the West Ham Corporation and the Gaslight and Coke Company, and that there was a chance of settlement. It is quite true that the Bill will affect thousands of consumers in West Ham, and, we believe, beneficially. But in view of what occurred in the Committee rooms, we know of nothing that could have seriously happened, or that the Gaslight and Coke Company could have conceded as being open to further negotiation, after the ratification by the Select Committee of the new clause requiring the Company to continue to operate the West Ham Gas-Works for ten years substantially to the extent obtaining during the year preceding the introduction of the Bill.

The reason given by Mr. Thorne for delaying the progress of the measure so long, does not appear sufficient. His tactics commenced in the last week in March; and, since then, week after week during the sitting of the House, he has pursued the same course. If his sole reason was the one stated, it was more benevolent than vindictive. But we have suspected there was another motive. If we are right, however, we will not impugn it. It will be remembered that the West Ham Corporation insisted very strongly before Mr. Mooney's Committee that the continuation of the West Ham works for ten years should carry with it the condition that the number of men employed there, with seasonal variation, should, throughout the decade, be continued as previous to the introduction of the Bill. In this plea, they were unsuccessful, for the Committee saw that it would be an irrational proceeding to tie any industrial concern, subject to the vicissitudes of fortune and technical development, to a condition for ten years that might prove irksome to the proprietors and disadvantageous to the general body of consumers. As a defender (according to his lights) of labour, Mr. Thorne may not have regarded the suggested condition as unreasonable; but fortunately all of us do not see things as do Mr. Thorne and his colleagues. However, the incident has ended; and we can discern no reason now why the Bill should not proceed without further hindrance.

A serious consideration arising from it is that any single member of Parliament should hold in his hands the power to obstruct for such a length of time, without explanation, a measure of so much importance, or, in fact, any measure that has met with the approbation, after investigation, of a Select Committee. Such delay, though in accordance with custom and private members' existing privileges, is, from our way of thinking, both an insult to the House and to the Committee who have considered the measure; and had it been the case of a Bill that had been delayed some time in its initial stages, the obstruction by a private member for weeks later in the session than in this instance might have proved fatal to the passing of the measure. Expended money and resulting public benefit might lie at the mercy of a single

intractable and unreasonable partizan; and there are too many sections in the House now with their own particular "axes to grind." This condition makes the course of Private Bills more uncertain than ever. Procedure might at least now be altered so that it should be obligatory on an objecting member to at once state the grounds of his action, and let the House decide there and then whether or not the grounds are sufficient, or whether delay in advancing the stages of the Bill concerned would be advantageous. The reason given by Mr. Thorne also indicates how the power of obstruction by a single private member might bring undue pressure to bear upon promoters.

An Objectionable "Principle" in Municipal Service.

THERE are a good many principles ruling in personal and business conduct that would be all the better for revision and perhaps complete sacrifice. There is one existing in the Standing Orders of the Birmingham City Council, which, however, has been set aside in the past in connection with the Education Committee and the Free Libraries Committee, and which the Gas Committee desire to modify in the present in a manner that meets with our heartiest approbation, and for reasons which can be clearly stated. We do not wish to in any way embitter the position at Birmingham; but we must say that in the speeches in opposition to the Gas Committee's proposal at the meeting of the City Council on Tuesday last, was a degree of petty argument and narrow-mindedness that ill-befits the rank that the Birmingham City Council have taken in the municipal world. There is a minute of the Council of twenty years ago to the effect that Committees shall report to the Council any proposal for the increase of the salaries of officers when such increase shall amount to £50 and upwards. This constitutes the principle upon which there was much tedious harping in the Council Chamber when the Gas Committee introduced a recommendation that they should be empowered to raise the salaries of their Station Engineers at Saltley, Nechells, and Windsor Street to a maximum of £1000 each, awarding the difference between the present salaries and the maximum by progressive steps as and when in the judgment of the Committee it should be considered desirable. This was the only resolution that was placed before the Council; a further recommendation that the same power should be conferred on the Committee in respect of the remuneration of Mr. G. Hampton Barber, the Secretary and General Manager (the maximum in this case being £2000), being withdrawn on an adverse vote—29 to 27 votes—on the motion regarding the Station Engineers' salaries. There was no question publicly raised as to the fairness of the maxima suggested by the Committee; the whole of the *vivâ voce* opposition being directed to what was considered an infraction of the principle that imposes a condition of publicity that is a discredit to municipal administration, and an objection—and it is a growing objection—to municipal service. The principle, too, is one that would not for an instant be tolerated by any member of the Council who gave it support if he himself were personally affected. As a matter of fact, the Committee were not asking the Council to set aside the principle, but merely to moderate it by fixing increases in the case of their chief officials beyond which the Committee were not to go without again approaching the Council for their consent, and which increases should be awarded by the Committee progressively according to the deserts of those to whom they applied.

This is a proper thing to do for more reasons than one. The Council, on the recommendation of the Committee, have reorganized the executive staff of the most important of the trading departments of the city. They have put upon the General Manager and Works Engineers of the department increased responsibilities and duties. They have consequently raised their status; and the present proposal of the Committee we recognize as a just and necessary appendix to the already adopted scheme. Whether or not we admit the correctness of the policy forming the basis of the scheme as being one suitable for general acceptance, is not the question before us. The fact stands out with striking prominence—and it would be negligent on our part not to acknowledge it—that, under the new scheme, during the past year, an excellent working and financial record has been achieved by the department. The official head of the department, and the chief Works Engineers have a right, in view of their increased individual responsibilities, to fair and encouraging treatment at the hands of the whole Council—treatment that accords with, and fits, the positions in which the Counc have placed them. The Council require the highest efficiency in the chiefs of the department; but the Council may be warned that they are not going the right way to work to get it. If there is one way more effective than another in crushing energy, it is by a course of action that imposes indignity upon the individual. And the very principle which appears to be the object of so much veneration by a number of the councillors is, it is said deliberately, an obstacle to realizing the best service, to encouraging the highest efficiency, and, we will go further and say, to maintaining by the chief officials the best discipline among their subordinate officers and the rank-and-file of the workers, and the respect of those subordinates and workers. The Committee controlling such a department, with its complex technical and commercial details and with ramifications peculiar to its work, are far and away the best judges of the proper value of the services of those in chief executive command under them. But when they recommend a fresh and deserved pecuniary acknowledgment of those services, and the conferring of that which gives some further encouragement, should there be an adverse vote in the Council—and adverse votes on the questions of the salaries of officers are becoming more common than ever in municipal chambers, owing to changing constitution of the membership—the official or officials concerned keenly feel the indignity that it conveys both within and outside the offices and works.

Municipal councils are composed of men of various shades of opinion. And it is an uncomfortable and baneful condition of municipal service that just reward for ability and fealty to entrusted interests can only be obtained by running the risk of opposition from those whose proclivities in public administration are of a narrow-minded and parsimonious order, and whose success in persuading a majority of a council to their way of thinking heaps upon the person concerned unmerited ridicule from certain sections of the community, with whom abuse of those in command is regarded as proper and even virtuous. Beyond this, under the system of public discussion of every item of increase, the amount of an official's salary and the extent to which it is to be advanced, are heralded forth to those among whom he lives and moves. The position is not a happy one for any men—much less for men of refinement and talent. Their compeers working under private enterprise are in the fortunate position of not being subject to the same indignity. The salaries of engineers in the employ of gas companies are fixed by the boards of directors; and the amounts of their incomes are not bruited abroad in the same vulgar way that obtains in municipal service. In the case of secretaries of gas companies, too, for several years past Parliament has been granting to boards of directors the same power of remuneration advance that they already possess in the case of the engineers. The same privacy applies to every employee, high or low, of the employer members of the Birmingham City Council. And it is right that it should be so. If men are worthy of being officers of a great concern such as the Birmingham Gas Department—if they prove themselves worthy, willing, and able officers, to whom responsibility stands for much—they are quite entitled to every respect the members of the City Council can accord them. Not one of the Councillors who proclaimed their veneration for the principle of public disclosure and debate in this matter would, we assert with confidence, submit to like treatment. They babbled over this particular principle, as though it were irreproachable. There is another one that enjoins us to do to others as we would be done by; and the more this high principle is applied by our local governing bodies to their treatment of municipal officers, the more attractive will they make municipal service. We do not suggest that the control of salaries should be entirely removed from the Council; but the principle of a maximum salary, and the leaving to the discrimination of a competent Committee of the stages by which that maximum shall be attained, meets with our unqualified approval, just as much as we condemn the paltry principle of insisting upon the public discussion of every proposed advance of the propriety of which a heterogeneous Council are incapable (as a Committee are capable) of forming a right judgment, and especially in connection with a large technical and trading enterprise like that of the Birmingham Corporation Gas Department.

We hope Sir Hallewell Rogers and the other members of the Gas Committee will stand firm in this matter, and that they will reintroduce their recommendation. The Committee are not going to abuse the power if granted by the Council. The members of the Committee are mostly men

of acknowledged business capacity, both within and beyond the city; and they are held in the highest esteem. They have the spending of large sums of money entrusted to them, with no more control than a report to the Council; and it will be a reflection on them if the Council refuse to empower them to dispense a few more hundred pounds as thought fit in adequately remunerating their chief officers. The action of the Committee in this matter will be closely watched by local authorities elsewhere. Sir Hallewell and his colleagues have the opportunity now of doing an important piece of work for municipal service, which, we repeat, has been for some years now losing ground in attractiveness to men of tried ability. The Birmingham Gas Committee can, if they stand firm, do something to restore that attractiveness, by bringing municipal service as nearly as possible in line with service under private enterprise. The Committee have able men in their service; and they want to retain them, and not allow them to depart at the call of a higher bidder, with conditions of service that confer greater personal dignity and give relief from the frequent irritation of an unenviable publicity. Municipal service has been weighed in the balance and found wanting; and we ask—and ask with sincerity—the City Council of Birmingham to do their part in showing a willingness to improve it in the manner suggested by the Gas Committee, and not persist in a course of procedure that has proved to be a failure, and is, to say the least, unjust and offensive to those chiefly concerned. The Birmingham Council have often led in municipal matters. Let them lead in performing this particular act of common justice as between man and man.

The Efficiency of the Slot Meter.

THERE are matters of the most commonplace order that do not strike one until—perhaps quite trivial—circumstances force them upon one's notice. Notwithstanding the large amount of popularity that slot meters have attained, there has been, we are indirectly reminded by a paper before us, comparatively little written about them, other than on their commercial aspects as valuable instruments in the development of the gas-supply business. The principles underlying design and their actual structure, outside the pages of patent specifications and reproductions in the technical press, have been neglected topics save by, in the seclusion of their works, the specialist makers. Perhaps the technicians of the gas-supply industry have given little attention to the discussion of principles and structure because the production of the meters has been a matter solely for makers of such apparatus. The interest of the technical officers of gas undertakings has, as a matter of fact, been largely confined to mechanical reliability and structural durability. But the tremendous increase that the slot meter has made in the number of meters on a gas-supply district is gradually causing the spread from the large undertakings to undertakings of more modest pretensions of the system of overhauling and repairing meters in the gas suppliers' own workshops. In view of this, there is an expansion of interest in the internal arrangements of meters, and careful records are now being kept on many gas-works as to the relative expense of repair and so forth of the various types.

Under these circumstances, there is opportuneness in the paper read before the Junior Institution of Engineers, by Mr. T. S. F. Gibson, Assoc.M.Inst.C.E., of the Old Kent Road works of the South Metropolitan Gas Company, on the construction of coin-freed mechanism as applied to gas-meters. The development of the slot gas-meter to the present state of perfection has been a gradual one; but it is remarkable how soon a number of workable instruments were brought forward in the early years when the phenomenal rise in popularity of this method of retailing gas gave splendid encouragement to workers to overcome the defects that experience disclosed. It could not be expected that a machine of this kind, in which there had to be harmonious working relationship between the coin and measuring and registering mechanisms, could be developed ofthand free of every blemish. What seemed to be the correct thing in the workshop was not adequate in all its details to face the threefold practical work of receiving, measuring, and registering for which the slot meter was destined. But, speaking generally of present mechanisms, there is really little fault to be found with them; and the slot meter of to-day is accepted as being a fair arbiter between seller and consumer. Credit for the fact that there is comparatively little complaint arising from these meters must not, however, be entirely claimed by the meter makers. Part of it is due to the fact that the meters receive a great deal more attention than the ordinary meters. The migration of householders using slot meters goes on to a far larger extent than is the case with ordinary consumers; and, from this cause alone, meters are brought at frequent intervals to the testing-plant and the repairing shop, in addition to the periodical systematic examination, district by district, that is made by many gas undertakings, and should be made by all. The meters are also frequently under the practised eye of the coin collector and meter reader; and anything that can be detected as wrong by outward sign is speedily reported. All this, of course, helps to keep the average of perfect working fairly high.

Though the coin mechanism is additional, the cost of repair per slot meter does not, on the average, within actual experience, work out to much, if anything, more than in the case of ordinary meters. But this is due to the more frequent attention; and this frequent attention costs money. Anything, therefore, that tends to simplification of mechanism without injury to efficiency will represent a welcome reduction of the cost of the maintenance of the important "ready-money" branch of the gas industry. Slot-meter maintenance costs are also greatly increased by money-box pilferers. But it would not be fair to attach the expense of this as though due to a defect in the slot-meter as an efficient instrument for the designed purposes. Mr. Gibson refers to the use of the strong money-box, and says that, where adopted, the cost of this must be regarded as "an "insurance premium against robbery." We would suggest he should add to this the words "and against the heavy "cost of repairing the mischief occasioned to the meter by "the robbery." The addition makes all the difference.

Municipal Gas Undertakings.

For the next few weeks a considerable amount of "JOURNAL" space will be occupied with the customary chronicling of the results of the working of gas undertakings in the hands of local authorities during the past financial year; and in this matter we look forward to being able to tell the usual satisfactory tale. It is true that trade depression is leaving its mark on gas, as on all other industries; but the indications seem to be that the effect has, at any rate in many cases, been less than might have been expected under the circumstances. Following the report of the Birmingham Gas Committee which was noticed at length a fortnight ago, we are able to give to-day the working results of several municipal undertakings. At Burslem, there is nothing but congratulation—which is thoroughly justified—in spite of the keen competition which has been set up by the Corporation Electricity Department. A scale of charges is in operation which descends from 2s. per 1000 cubic feet for gas supplied to ordinary consumers, down to 1s. to the largest users for motive power purposes; and there is a net profit of £2321, of which £1200 goes in relief of the rates. Low prices are naturally coupled with a large make; and this, for the past twelve months, works out at no less than 12,036 cubic feet of gas per ton of coal carbonized. The capital amounts to £679 per million cubic feet of gas sold. All the carbonizing plant has been brought thoroughly up to date; and it will be noted that the whole of the gas is now being produced in inclined retorts. From Burton-upon-Trent there is also a good report; the Chairman of the Committee remarking upon the evidence given "of great care having been exercised to secure the best results." During the past year, for the first time in the history of the gas-works, over 10,000 cubic feet of gas were sold per ton of coal carbonized. The make per ton was 10,762 cubic feet. A surplus of £8733 has been realized (of which £6500 has been handed over in relief of the rates). The surplus is less than was the case twelve months ago; but the consumers have no cause to regret this falling off, inasmuch as for three-quarters of the past year they have been in the enjoyment of a reduction of 3d. per 1000 cubic feet on gas supplied through both ordinary and prepayment meters. There was a decrease of 1½ per cent. in the amount of gas sold; and it seems that the Committee have, unfortunately, for some years had to face a steady falling off in this direction. There is a net profit at Hinckley of £2683, which is about £800 less than in the previous year; but here, again, the smaller surplus is accounted for by a reduction in the price of gas. A sum of £520 is transferred to the general

district rate. At Rotherham, there was a record yield of gas, per ton of coal carbonized, for the department; the figure being 12,345 cubic feet, as against 12,130 feet in the preceding year. There is a net profit of £5395, compared with £7431; but here, once more, the consumers have benefited by a reduction of 3d. per 1000 feet. It seems that Rotherham is one of the places which enjoy "free public lighting;" for the following sentence appears in the report: "If the gas for public lighting (£2413) is again given by the department, as in former years, there remains an available surplus profit of £2981." From St. Helens, is reported a small increase in the output of gas, in spite of the bad state of trade; while the net profit amounts to £9100, out of which it has been decided, for the fourth year in succession, to hand over £5000 in relief of the rates. From a reference appearing in a local paper (which we reproduce elsewhere) it is evident that St. Helens is—and quite justly—thoroughly well pleased with its gas undertaking. It will be noticed that "very good results" are reported regarding the experiments that are taking place there with vertical retorts.

Profit Limitations and No Free Gas.

If the Salford and Oldham Corporation Bills inaugurate a new policy on the part of Parliament in exercising greater control over the revenues of municipal trading departments, and in producing greater protection for the consumers, it will do something to lessen the fascination that has so long existed among local authorities for launching out into municipal trading. The real incentive to municipal trading has not been improved service, but the obtaining of new sources of revenue to minister largely to prodigality, with the further result (which does not trouble the majority of our local governors) that a perpetual contribution to the public expenditure is extracted from one section of the community to lighten the share of the public burden of the, through those sources, non-contributing sections. Limitation of appropriation of gas profits in aid of the rates has existed at Oldham since 1886; but there is to be greater definiteness now than in the past by the amount to be taken annually being strictly confined to £7500. But Oldham has been taking full advantage of an antiquated power to use gas and water free for public purposes; and the cost of this has come out of the pockets of the consumers. The ratepayers, as a whole, are in future to pay for their public use of gas and water the same as they pay for other public services. Under this head the revenue of the Gas Department will benefit by something like £7500, and that of the Water Department by somewhere about £3000. This is so much to the good towards the cheapening of gas and water to the consumers, for the lowering of prices is to be the destination of surpluses in future. Bank interest on uninvested sinking funds is no longer to go to the borough rate, but is to be retained by the departments. One of our Oldham contemporaries calculates that, in consequence of all this revision of the relationship between the Corporation and the gas and water consumers, something like £13,000 more will have to be found by the borough rate. This cannot be helped. Every tub should stand on its own bottom. The attitude of the "JOURNAL" from its earliest days in its claim for the liberation of the consumer from unfair burdens which amounted to indirect taxation, has been vindicated by the action of Parliament this session in the cases of Salford and Oldham. The subject was fully discussed last week. But it may be mentioned here that the decisions of Lord Donoughmore's Committee and of the Local Legislation Committee have created much uneasiness in municipal circles; and certain corporations with municipal trading enterprises from which thousands and tens of thousands of pounds of profits are being extracted yearly are already quietly determining that a respectful distance shall as long as possible be maintained between them and Parliament.

The Position in South Wales.

Attempts at conciliation are being made in the South Wales coalfield, which give some small cause for hope that, after all, a way may be found out of the difficulties that have arisen in connection with the operation of the Miners' Eight-Hours Act. On Monday of last week, the South Wales Conciliation Board held a meeting at Cardiff, at which two far-reaching questions were discussed. The result was that a demand made by the owners for a 7½ per cent. reduction in wages, being resisted by the men's representatives, was referred to the Independent Chairman; while (with the reservation of the right to tender notices on June 1) the owners agreed to refer to a Joint Sub-Committee the still more crucial question of the working arrangements under the Eight-Hours Act. This Committee will consist of six representatives from each side of the Board, with the two Secretaries. The first meeting was held last Friday; and a final report will be handed in at a special meeting of the Conciliation Board to take place on Friday of this week. That as little time as possible is to be spent in discussing the matter, and thus leaving the question open, may be taken as an encouraging sign, while the declaration that both sides are animated by a desire to avoid conflict may afford some additional comfort to those who are naturally optimistic. The men's representatives are credited with the assertion that they are prepared to consider any suggestion from the owners' side which would not involve a reduction of wages or hardship in the changing of shifts. What proposals the owners may be able to formulate which will not infringe one or other of these stipulations, we do not yet know; but one thing is clear—and it is that the whole of the discussion has been brought about by the firm belief of the owners that the operation of the Act will considerably increase the cost of working the collieries. Bearing this in mind, it seems that any terms they assent to must be such as will secure some economy in working which does not appear to them to be realizable, with the new Act in force, under existing conditions. Meanwhile, the opinion of one of the speakers at a meeting on behalf of the men is that any attempt to reduce the wages of the day-wage men will result in the most disastrous strike the world has ever seen. Of course, this sort of talk has been heard before, without anything very serious coming of it; but, for all that, it hardly seems to denote a "conciliatory" frame of mind.

Protection of Children from Gas-Fires.

A short time since a little girl in South London sustained such injuries by her clothes coming in contact with the lighted burner of a gas grill that she died. It appears that she climbed upon a chair to reach a bag hanging on a wall over the gas grill, with the lamentable result stated. The Coroner, at the inquest, incidentally made a remark that such a case as this was not contemplated by the framers of the Children Act. The words were instantly seized upon by a few doubtless well-meaning but unpractical people, who thought that, where there were children henceforth all gas fires and stoves should be provided with a guard. This view found expression in a question put in the House to the Home Secretary. Mr. Gladstone saw the impracticability of legislating for an uncommon danger. It is, as he said, quite impossible to provide by Act of Parliament against every source of danger. The Children Act was intended to meet the common case of open fire grates; and he was afraid that it would be impossible to prevent accidents under exceptional circumstances, such as occurred in this instance. When consideration is given to the fact that there are a few million cooking-stoves, grills, boiling-rings, gas-fires, &c., in use in the British Isles, it will be recognized that it would be a vast business to guard them all where there are children. But the fact that accidents to children through the existence of gas-stoves are such singular occurrences, and that death and injury are so frequent through ordinary open fires, speaks much for the safety of the former. If the suggestion to the Home Secretary had been that parents should be adjudged culpably negligent if they hang such things as bags over gas-fires or stoves in such a position as to necessitate a child mounting a chair to reach the article, there would have been a greater amount of sense in it than there is in the idea that all gas fires and stoves should be guarded.

The Growth of Trade Unionism.

Whatever may be the case with individual branches of industry, Trade Unionism—judging from official statistics, which are not, however, quite up to date—seems on the whole to be growing at a rate which must be satisfactory when gauged from the standpoint of the paid officials. There was last week issued the sixteenth report on Trade Unions in the United Kingdom, prepared by the Labour Department of the Board of Trade, and covering the three years from 1904 up to the end of 1907—the latest date to which returns were available. This lateness of publication, it must in fairness be pointed out, is largely owing to the fact that the accounts of the registered Unions

are, under the Trade Union Act of 1871, not due at the office of the Chief Registrar of Friendly Societies until the 1st of June following the year to which they relate; and they are not, even thus, always delivered within the prescribed limits of time. However, taking the statistics as the latest procurable, it may be stated that at the end of 1907 the total membership of Trade Unions was 2,406,746, or 500,000 more than at the end of 1904—a greater rate of increase than in any period of three years since the statistics were first compiled. The accounts of one hundred of the principal Trade Unions, comprising 1,460,000 members, show that their total income in 1907 was £2,493,000, or £378,000 more than in the year 1904; while their expenditure was £2,054,000, or the same as in 1904. The expenditure on unemployed benefit, which had risen every year, from £185,000 in 1899 to £655,000 in 1904, fell to £523,000 in 1905, and to £424,000 in 1906; rising again in 1907 to £466,000. The total cost of this benefit during the ten years from 1898 to 1907 was over £4,000,000. Dispute benefit cost £500,000 during the three years ending 1907, which is practically the same amount as was expended in each of the two previous triennial periods. The total cost of sick and accident, superannuation, funeral, and other benefits (except unemployed and dispute) showed an annual increase, from £849,000 in 1904 to £975,000 in 1907. Of the total expenditure of the hundred Trade Unions in the three years under review, 8·2 per cent. was spent on dispute benefit, 69·3 per cent. on unemployed and other friendly benefits, and 22·5 per cent. on working and miscellaneous expenses. The total funds of the Unions at the end of 1907 were £5,638,000, as compared with £4,666,000 at the end of 1904; the amount of funds per member being about £3 17s. 6d. in each of these two years, as against £2 8s. 8d. in 1898.

A Steel Water-Tank, erected in 1868, is still in service at the Rock Island Railway shops in Chicago, according to the report of the Committee on Water Service of the American Railway Engineering and Maintenance of Way Association. It is built of ⅜-inch and ¼-inch plates. The pitting inside is shallow, and since the outside is now kept well painted, though it was formerly neglected, the tank is expected to last double its present life.

The Petrol Duty and Benzene.—In the House of Commons on Monday of last week, Mr. Lonsdale asked whether the duty on petrol and other spirits used for motor vehicles was a customs duty; and, if so, whether it was intended to put a corresponding excise duty upon Scottish paraffin spirit and upon British coal-tar benzene, and any other home-made spirit capable of being used for motor vehicles. Mr. Lloyd George replied that the duty on imported motor spirit was a customs duty, and there would be a corresponding excise duty. Mr. Lonsdale inquired whether the right hon. gentleman would name the products which were comprised within the term "petrol," for the purposes of the new taxation. Mr. Lloyd George, however, said he did not think it was desirable that he should make a statement on the subject until the Finance Bill was in the hands of the House.

Action of Impure Surface Water on Lead Pipes.—According to an abstract of an article by Herr *Z.* Aschoff in the "Journal of the Society of Chemical Industry," the author has recently examined a lead water-pipe which had lain for some fifteen years in a sandy clay soil. The outside of the pipe was very corroded, and yielded considerable quantities of lead, chlorine, nitric acid, and traces of ammonia when treated with hot water. The surrounding soil had a feeble alkaline reaction, was saturated with impure surface water, and contained appreciable quantities of lead derived from the pipe. While most of the compounds formed by the action of the wet soil on the lead pipe were soluble, and were consequently removed as the water percolated slowly through the soil, some lead carbonate was present on the pipe. The author considers that where it is necessary to employ lead pipes in such soils, the pipes should be coated with asphalt.

Incandescent Light for the Eyes.—The effect upon the eyes of prolonged work with artificial light of too great intensity, is discussed in a paper by Dr. Terrien in the "Journal de Medicine Interne." He finds that incandescent gas light and electric light are both liable to produce erythropsy, photophobia, and even temporary abolition of vision. These effects he attributes to the action of the ultra-violet rays upon the eye. He divides the different artificial lights into three classes, according to the proportion of ultra-violet rays they transmit. The first class comprises the candle and oil lamp, and are very poor in actinic rays. The second class includes petrol and gas (except with incandescent mantles); and the third class comprises all varieties of incandescent lamps, acetylene, and electric. From a hygienic point of view for the eye, the oil lamp is, the author considers, by far the most suitable; but he thinks that means can be adopted to annul the evil effects of the more modern forms of artificial light. He proposes that electric bulbs should be tinted a light yellow, and suggests that slightly yellow-tinted glasses mounted in pince-nez or spectacles should also be worn by those who are compelled to do prolonged near-work by the artificial lights named.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 470.)

THE Stock Exchange has had an active and lively week—almost like the old times revived—and, what with the settlement of a fairly heavy account, and with a considerable impetus in new business, members could not complain of time hanging on their hands. Pretty well every department came out better at the end; and conspicuous among the rest was the South African Market. The cheerful tone, with rising prices, characterized the opening day, but was not universal, as it failed to reach Consols and their class. On Tuesday, there was some hesitation at first, and prices were rather uncertain; but confidence gained ground, and a general advance ensued. Wednesday was quite cheerful. A happy factor in the gilded market was the popularity of the London County Council loan. All the best lines were higher; and some not of the best participated. On Thursday, the satisfactory settlement afforded gratification; cheerfulness continued to rule; and Consols continued to rise. On Friday (so often a day of realizing counteraction), the upward movement proceeded merrily. Consols rose $\frac{3}{16}$; and strength was apparent in the Foreign Market, Home Rails, and others. Business fell quite quiet on Saturday; but there was no reaction, and prices in general held on firmly. In the Money Market there was a strong demand, mainly for the Stock Exchange settlement and the London County Council loan, which stiffened rates in the mid-week. Discount quotations were on parallel lines. Business in the Gas Market was rather quieter than in the week before; but the general tendency was excellent, and a large number of quotations had further advances. At the Mart, on Tuesday, several parcels of Suburban and Provincial shares were offered and taken at good prices. In Gaslight and Coke issues, the ordinary was quieter and wholly unchanged, marking (as in the previous week) 103 to 103⅜. In the secured issues, the maximum was done at 88¼ and 88½; the preference at from 105 special to 105⅞; and the debenture at 85½ and 86. South Metropolitan was steady at from 123 to 124¼; but one transaction was noted as being done at 122½. The debenture fetched 86. In Commercials, there were only two or three transactions in the 4 per cent. at from 108¼ to 109. In the Suburban and Provincial group, British realized 43 and 43⅛, Ilford "A" 136, Tottenham "B" 111½, ditto debentures 101½, South Suburban 121¼, Wandsworth "B" 140½, and West Ham 120½. In the Continental companies, Imperial changed hands at from 186⅛ to 188, *cum div.*, and from 182⅛ to 183⅛ *ex div.*, ditto debenture at from 95½ to 96⅛, Union at 100¼, ditto preference at 140 and 140½, European fully-paid at 24, and ditto part-paid at 18 and 18⅛. Among the undertakings of the remoter world, Buenos Ayres marked 13⅛ and 13⅞, Cape Town preference from 5¼ to 5¾, Monte Video 12⅛, Primitiva preference 5 5/32 to 5 5/16, River Plate 14¼ to 14 11/16, and San Paulo 13 15/16.

ELECTRICITY SUPPLY MEMORANDA.

Electricity Generating Station Chimneys—Domestic Smoke and Cooking by Gas and Electricity—Failures, Electrical and Explanatory—Exaggerations—Reminiscent of the Past—Fallen on Evil Days.

THE London County Council have their eyes on the chimneys of electricity generating stations. They, among other factory shafts, are guilty of belching forth smoke of a deleterious and sulphurous character; but there is something wrong about the colour of the smoke to secure convictions under the present law. This inadequacy of the enactments the Council are contemplating putting an end to in the parliamentary session of 1910. The sources of smoke nuisance in London, except locomotives and domestic chimneys, are subject to the operation of sections 23 and 24 of the Public Health London Act, 1891; but sections 23 and 24*a* are so crippled by qualifying words, that it is difficult to obtain a conviction under them. The provision that is of real value—section 24*b*—deals solely with "black" smoke; and this is the only portion of the smoke sections of the Act that is enforced by the majority of the Metropolitan Borough Councils. The limitation of this effective section to "black" smoke is unfortunate, as very frequently smoke of other colour than black is emitted in such volumes as to cause a very serious nuisance, and yet, under the existing law, it is impossible to penalize the offenders. Therefore the Public Control Committee of the County Council think that the extension of section 24*b* to cover any serious emission of smoke irrespective of colour would be most useful. The recollection has not been dimmed by time of the unsuccessful and costly proceedings in 1907 in connection with the Chelsea electricity generating station of the Underground Railways Company. That case was dismissed, with 300 guineas costs, against the Borough Council who had taken the proceedings; the magistrate stating that it had not been proved to his satisfaction that the smoke the subject of the summons was "black" smoke. Some of the electric lighting corporations contend they are exempt from penalties for smoke nuisance, as the nuisance arises in connection with the discharge of their statutory obligations. The plea has never yet held good in the case of statutory gas-works. Some electricity undertakers, when applying to Parliament for new powers, have endeavoured to obtain relief from the existing law

relating to this particular form of nuisance. There is no reason why such exemption should be granted. Only recently the Public Control Committee have had under consideration a serious nuisance arising from the electricity works of the Stepney Borough Council; and they think it would be well if the County Council had power to act in such a case. Hence the suggested amendment of the law. In a reference to the domestic smoke nuisance, with which it is not proposed to deal at present, the Committee look hopefully to a large reduction of smoke from private houses through the growing use of gas and electricity for heating and cooking. They mention that it has been found that nearly half-a-million gas cooking-stoves are now in use in London, and that the use is steadily increasing. If the Committee had said the number of gas-cookers on hire from the three London Companies is nearly 650,000, they would have been closer to the mark. But in their report they leave out something important—that is the number of electric cooking stoves and ranges on hire in the Metropolitan area. It is hoped the omission will be repaired.

Misfortunes rarely come singly—the Hastings Electricity Department are in full agreement with this. The financial results of their recent trading are generally contrary to what is desired; extensions of the distribution system are made, and they turn out unprofitable; proposals are put forward, without any due regard for the tenth commandment, to convert gas-lamps to electric lamps, and the Local Government Board refuse to grant the necessary loan. And, in the midst of it all, there have been two failures of the lighting in the town. Both occurred on Thursdays—the Thursday preceding Good Friday, and the first Thursday in this month. It was most unfortunate that these mishaps should have coincided with the raising of the price of the current; and business people—especially hotel and boarding-house keepers—must have been considering, with anything but pleasurable feelings, the irony of circumstances that compel them to pay more for a light that is so unreliable, and occasions them so much inconvenience, anxiety, and loss. Of course, the Electrical Engineer of Hastings is only human. He cannot help these breakdowns; and no electrical engineer has yet been born who can prevent them. According to a statement in the Council, it was a main cable that fused and gave Hastings its latest electrical excitement. It was something of the same kind of thing that occurred at Belfast on April 13, and caused a breakdown there. But about the failure at Hastings, there were other interesting incidents accompanying it, according to Alderman Tree. But we refuse to be responsible for the accuracy of the aldermanic narrative, and so reproduce Mr. Tree's reported utterances: "The previous evening he met Mr. Ferguson about a quarter past ten. He informed him that the main cables had fused; and they had not been able to find out where it was. Mr. Ferguson had taken him to the chamber at the Hospital. They had found it full of sulphur; and from a portion of the plant flames were coming out. These were put out by throwing sand over them. There was a certain amount of plant very seriously damaged. Mr. Ferguson said several other boxes and transformers had fused; and it was impossible for him then to find out where it was. As a result, he had to go back to the first box from the works; and go on until eventually he found where the damage and breakdown had occurred." Fortunately, the people of Hastings are used to all sorts of complications in connection with the electricity supply; so they have not been surprised by the Alderman's explanation.

"The exaggerations of the gas interests really beggars description," says the "Electrical Contractor;" and accompanying this exhibition of a want of courtesy are such unkind expressions as "gas nonsense" and "absurd"—the last-named expression occurring twice in one line. As an interesting exercise our little monthly contemporary corrects some figures favourable to gas that were published recently, and "gives an honest comparison of the costs of electricity and gas." An interesting exercise will be to correct our contemporary's figures, and test the honesty of the statements.

"Electrical Contractor's" Figures.

Electricity.			Gas.		
30-c.p. Osram for 1000 hours consumes 33 units at 6d.	16	6	30-c.p. inverted burner for 1000 hours consumes 4000 c.f.	£1	0 0
Osram lamp	2	6	5 mantles at 4½d.	1	10½
Six months' decoration	6	0	Matches		6
			Six months' decoration	15	0
	£1	5 0		£1	17 4½

The first table we should correct by adopting 37½ units for a 30 Hefner unit Osram lamp for 1000 hours' use. But the most serious objections refer to the table dealing with gas. The "Electrical Contractor" has never met with a genuine 30-candle power inverted gas-burner which, giving such a light, consumes less than 4 cubic feet an hour—that is to say, the efficiency is only 7½ candles per cubic foot of gas consumed per hour! We shall, without permission, regard this as "nonsense" and "absurd" until the "Electrical Contractor" is able to show us the inverted burner giving only 30-candle power that will pass 4 cubic feet of gas per hour. The 4 cubic feet meanwhile we reduce to 1½ cubic feet; and the charge for gas should be (say) 2s. 6d. to 3s. Let us say 3s., and not 5s. Then, with great magnanimity, our contemporary says: "We will also credit the inverted mantle with a life of 300 hours, keeping in mind, of course, the necessity for maintaining a genuine 30-candle power light." After this display of generosity, it will be seen that the "Electrical Contractor" charges up "five" mantles and not 3⅓ in the calculation, which 3⅓ on the average is too high. Then as to matches. Awfully extravagant this "Electrical Contractor" calculator! He must not play with matches. He suggests by the 6d. the lighting up of the inverted burner about twice every hour in the 1000, instead of keeping it in use (say) on an average something like three hours at a time. In a dozen ordinary safety-match boxes, purchasable at 1½d. or 2d., there are about 600 matches, so we will put down a 1d. for matches for the 1000 hours' lighting, which will allow us to light up the burner 300 times or upwards in the 1000 hours. Finally, we will adopt 6s. for cleaning in both cases. Then we got the following revision of the honest comparisons:

Electricity.			Gas.		
30-c.p. Osram for 1000 hours consumes 37½ units at 6d.	18	9	30-c.p. inverted burner for 1000 hours consumes 1500 c. ft. at 3s. per 1000 c. ft.	4	6
Osram lamp	2	6	3 mantles at 4½d.	1	1½
Six months' decoration	6	0	Matches	0	1
			Six months' decoration	6	0
	£1	7 3		11	8½

Even 6s. damage from a 30-candle power inverted lamp after 1000 hours' use is ridiculous. Redecoration is as necessary from sanitary reasons in the case of electricity as in that of gas; so that, if this cost be omitted, we get for the 30-candle power electric lamp an expense of £1 1s. 3d., against 5s. 8½d. for a 30-candle inverted gas-lamp. The calculator of our contemporary in our—of course, disinterested—judgment is not so immaculate as he paints himself.

A reminder is given of the days when electric lighting schemes were as thick as the grapes on a fruitful vine. In those days schemes were boldly put forward, and estimates made by electricians as to profits which, alas! in a large percentage of cases, have not worked out as predicted. Southgate is agitated as to what shall be done in the matter of a supply of electricity in their area. The District Council are the owners of an Electric Lighting Provisional Order; and they are so satisfied with the arrangements they have made with the two Gas Companies in the district, and do not like the speculative aspect of electricity supply in their purely residential area, that they are averse to putting down a generating station of their own, or taking electricity in bulk from the North Metropolitan Electric Supply Company. They have therefore entered into an agreement for the transfer of their powers to the North Metropolitan Company. Then enters Mr. Spencer Hawes, a resident, and an electrical engineer of (we will not dispute the local newspaper's estimate) high repute. In the goodness of his heart, Mr. Hawes tenders some free advice to his fellow householders in Southgate. He prefers that the Council should take electricity in bulk, distribute it, and run the business. His computation of the profitable effect works out quite in the correct fashion of the penny novelette. If 400 householders in Southgate kindly consent to have their houses wired and take 132,000 units per annum at 5d. per unit, if 65 shops kindly agree to consume 47,000 units at 4½d. per unit, and if for power, heat, and other purposes 15,000 units are used at 2d., making a total consumption of 195,000 units out of 242,000 units purchased by the Council (allowing about 25 per cent. loss in distribution), well then there should be on the transaction a surplus of £500. There is far too much "if" about this; and there is not sufficient margin in the calculations and prospects in Southgate for safety. But, says Mr. Hawes, see what Rugby has done! It had a surplus of £362 last year! But Mr. Hawes we believe has intimate knowledge of the "Electrical Times" tables; and we reply, See what 79 of the electric undertakings have done whose figures for their last financial years are included in those tables. They have made deficits. In every case, we have no doubt, the owners of the undertakings were told by "eminent electrical engineers" that, if so and so occurred, there would be a profit. The necessary conditions have not been fulfilled, and prognostications have been falsified. Then it will interest the Harrow Gas Company to know that at Harrow "there is a successful Electric Light Company, gas is 3s. 6d., and electricity is popular for lighting, and gas is taken for cooking." This is merely a picturesque way of putting the matter. Of course gas is used for cooking where electric lighting is employed; but the use of gas for lighting has also been increasing by leaps and bounds in Harrow, despite the efforts of the Company in which Mr. Hawes is concerned.

The Reading Electric Supply Company, Limited, have fallen on evil days. They are only representative of many other electricity undertakings in the country that have not such opportunities as certain favoured west-end London Companies, Glasgow, Edinburgh, Liverpool, and other large Corporations, and the Newc—— no, we must at present also exclude the at one-time paragon of electric power companies. Reading has long held interest for us, as it was one of the earliest of the provincial companies to try to build up their fortunes by maligning gas in circulated literature, which spoke of its supposed fearful poisonous qualities. The gas consumers of Reading still live; and gas has since been installed in several places where the electric light found temporary abode; the shareholders in the Gas Company continue to enjoy reasonable dividends, and have the felicity of seeing their business increasing. To-day the Electric Supply Company's capital account is overspent by £20,353, the balance of the reserve fund has been completely absorbed, no dividend can be paid owing to the financial condition of the undertaking, and the Directors have been working without fees since some time in 1907. The capital expended now stands at £167,778; the total issued

capital amounts to £147,425—showing the £20,353 overspent, though of the authorized capital there is only £2575 remaining to be issued. On this large expenditure of capital, only £3300 was set aside from revenue for depreciation last year, which represents an equated life of fifty years for the whole of the subjects on which there has been capital expenditure; whereas, if we deduct the £834 spent on land, the £23,685 on buildings, the £3823 representing the cost of the Licence, Provisional Order, &c., and the £403 expended on office furniture, &c., all the rest of the capital of £167,778 stands for subjects to which expert opinion allocates a useful life (according to subject) of not much more than thirty down to five years. It is not found that compensation is made for this small allowance for depreciation by large expenditure on repairs, maintenance, and renewals. Some of the amounts so spent seem absolutely trivial; and they give one the impression that there has been the smallest possible amount of work done in this direction to save the face of the revenue account. Of course, we cannot judge from the printed figures; but perhaps some of the repairs and maintenance has found harbourage in the capital account. This is not stated as a fact, but is merely a suggestion, as the items in the revenue account seem so remarkably low.

But with all the obvious shaving down of expenditure, with a revenue of £15,438, the balance (deducting the contribution to depreciation) of the net revenue account is only £4509. Carrying this and the balance of £700 at reserve to the net revenue account, there is a balance of £4830. But £4231 of this is to be utilized in wiping off part of £7231 standing in the capital account as representing discarded gas-producer plant, which was adopted on the advice of the Company's late Engineer. The anticipations originally formed as to the working of this plant have not been realized; and the late Engineer has to bear the blame. There will still be £3000 outstanding in respect of this plant, pending its sale. But the plant is not the real cause of the Company's want of commercial success. The new metallic filament lamps, the Directors say, have caused a "considerable diminution of the Company's profits;" and yet the number of units sold last year shows an increase of 67,337 on the previous year, and the increase of 1907 over 1906 was 50,282 units. Putting these statements together, they suggest that, as there was a considerable decrease of profits, the increased number of units sold must have been at prices much below lighting rates. We venture to say, too, that changes from electricity to gas have also caused a shrinkage of business of the more profitable kind. Taking this trend of trading affairs into consideration, the overspent capital account, the small spendings on repairs, maintenance, and renewals, the non-payment of Directors' fees, and the (in our view) comparatively small amount set aside for depreciation—well, were we shareholders in the concern, it would not be with delight and confidence that the future would be surveyed. The report of the Directors is dated April 23; the meeting of shareholders was only held on Friday last; and the accounts dealt with the position of affairs to Dec. 31 last! The delay can be appreciated.

THE LIVESEY MEMORIAL FUND.

We have received from Mr. Walter T. Dunn the following list of further contributions to the fund:—

1909.		£	s.	d.
May 10	Previously acknowledged	9216	18	7
,, 11	James Braddock, Radcliffe	2	2	0
	Harold E. Riley, St. Austell	0	10	6
	St. Austell Gas Company	1	1	0
	James M'Leod, Greenock	1	0	0
	Romford Gas Company	3	3	0
,, 13	W. F. Cotton, Dublin	10	10	0
,, 17	Gloucester Gas Company	26	5	0
	Lawrence Hislop, Uddingston	2	2	0
	Alexander Waddell, Dunfermline	1	1	0
	Total	£9264	13	1

Gas v. Electricity for Secondary Schools.—In the course of a paper read before the Society of Architects last Thursday, by Mr. G. T. Forrest, Architect to the Northumberland Education Committee, on "Present Methods of Planning and Equipment," the author discussed the question of lighting, and said that up till quite recently it was surprising how relatively small an amount of consideration had been given to the problem of artificial illumination in schools. During the past nine years, he had had occasion to visit and report upon a great many schools of different types; and he regretted to have to state that the misapplication of artificial light was everywhere apparent, and this represented actual waste. Now, however, the competitive development of gas and electricity was steadily educating the architect to a higher standard of artificial illumination. This standard was the outcome of steady development of efficiency in the illuminants themselves, as well as in methods of their application. The general question as to whether gas or electricity was the more suitable illuminant for a school was a large one; but after careful study and inquiry he had come to the conclusion that incandescent gas was the better of the two illuminants, and a safer one for pupils' eyes.

PERSONAL.

Mr. A. Denford, of the Weymouth Consumers' Gas Company, has been appointed to the position of Maintenance Inspector to the Staines and Egham Gas Company, which was advertised in the "Journal" recently. There were about 150 applications for the post.

At a meeting of the Directors of the Crewkerne Gas Company on Monday of last week, applications for the post of Manager and Secretary, in succession to the late Mr. John Nicholls, were considered. Mr. H. Wilkinson, of the Yeovil Gas-Works, was unanimously appointed to the position.

Mr. C. E. Rosevear, of the Gaslight and Coke Company, has obtained the appointment of Distribution Superintendent to the Hythe and Sandgate Gas Company, applications for which were recently invited in the advertisement pages of the "Journal." Mr. Rosevear has passed several examinations; the most important certificates, &c., held by him being the Regent Street Polytechnic and City and Guilds of London first-class passes, and a London County Council Scholarship for Gas Engineering.

OBITUARY.

After having been for some time in failing health, Mr. W. Morris, the Gas Manager to the Maryport Urban District Council, died last Sunday week. Deceased, who was about 62 years of age, leaves a widow and family of seven.

The death took place at Turriff, Aberdeenshire, on Wednesday last, of Mr. John Hutcheon, Provost of the burgh. Mr. Hutcheon was Chairman of the Turriff Gaslight Company, Limited, for many years. In 1865, he was elected Chief Magistrate of the burgh; and with two short breaks he had held the office since—his occupancy of the civic chair extending over the long period of about forty years.

The death took place last Thursday of Mr. John William Sutherland, aged 69 years, the Secretary of the Sunderland and South Shields Water Company, to which position he was appointed in 1877. Mr. Sutherland completed, on Dec. 31 last, fifty years' service with the Company; and at the annual meeting in February he was presented by the Chairman (Mr. R. H. Gayner) with a silver salver, suitably inscribed, in commemoration of the occasion, and as an expression of the goodwill and esteem of those whom he had so long and faithfully served. The interment was fixed to take place yesterday at Bishopwearmouth Cemetery.

Association of Gas and Water Engineers of Austria-Hungary.

The programme of the annual general meeting (the 28th) of this Association, which, as already announced, is to be held at Grätz on the 20th to the 23rd inst., has now been issued. The proceedings will open with a reception and military concert on Thursday evening. The technical proceedings will commence on the following morning with the inaugural address of the President of the Association, Herr Joseph Anzböck, Chief Inspector of the Imperial Continental Gas Association's works at Vienna. The rest of the morning will be devoted to the reading of the papers dealing with gas supply—viz.:

(1) "Modern Photometry," by Professor H. Strache, of Vienna.
(2) "The Inclined Carbonizing Chambers at the Municipal Gas-Works at Vienna," by Herr F. Bössner, of Vienna.
(3) "The Rental System of the Gas-Works at Innsbruck," by Herr Oswald Peischer, the Manager of the Works.
(4) "The Use of Gas for Heating, Cooking, and Industrial Purposes," by Herr J. Häusler, of Vienna.
(5) "Notes on a New Electric Distance Lighter for Gas-Lamps," by Herr Friedrich Lux, of Ludwigshafen.

In the afternoon a visit will be paid to the gas and electricity works of Grätz; and in the evening those attending the meeting will be entertained by the Vienna Gas Industry Society. On Saturday, the morning will be devoted to the election of officers and other private business and to the reading of the following papers:

(1) "Preliminary Studies on the Quality of Underground Water," by Herr H. Adolf, of Vienna.
(2) "Advances in Inverted Lighting, with Special Reference to High-Pressure Gas and High-Pressure Air Intensifying Lamps, and New Standards and Supports," by Herr Max Scholz, of Berlin.
(3) "Street Lighting with Lofty Gas-Lamps and the Standards, Brackets, &c., required for the Same," by Herr H. Wunderlich, of Carlsbad.
(4) "Ignition of Gas by Means of Metallic Cerium," by Herr H. Wunderlich, of Carlsbad.
(5) "Complete Removal by Washing of Sulphuretted Hydrogen from Coal Gas with Recovery of the Whole of the Sulphur in the Lump Condition," by Herr Walter Feld, of Zehlendorf, near Berlin.

In the afternoon a visit will be paid to the new water-works of the town of Grätz, at Andritz; and in the evening there will be a banquet. On Sunday, an excursion will be made to Peggau. There will be a small exhibition of gas apparatus in a room adjoining the hall in which the meetings will be held.

NOTES FROM WESTMINSTER.

THE most important happening last week was the floating off again of the stranded Gaslight and Coke Bill, by Mr. William Thorne withdrawing the motion he had tabled. More has been heard of the question of gas profits and free gas in connection with the Oldham Corporation Bill; and the indications of the previous week have come to pass. The Harrogate Gas Bill which was hung up for a few days by the delay in the receipt by the Unopposed Bills Committee of the Home Office report, has now passed from the review of that Committee, with a clause inserted for the protection of persons in premises in which power gas is used; and, by the exclusion from the Bill of the words "in the case of any fittings which the Company may let on hire after the passing of this Act," the whole of the fittings of the Company on hire will be exempt from distraint when marked, whether or not they were let on hire before or after the passing of the Act. The Wells Gas Bill has been before the Unopposed Bills Committee; and, after hearing the Parliamentary Agent and Mr. Corbet Woodall, the Committee ordered it to be reported. The Glamorgan Water Board Bill has been creating a large amount of local interest. It was before a House of Commons Committee during the week, and up to the time of going to press was still under consideration. Further attention will be given to it in the "Notes" on the Committee's decision being delivered.

Oldham Profits and Free Gas.

By Wednesday last, the Local Legislation Committee were prepared to take up the gas and water clauses of the Oldham Corporation Bill. From what was stated last week, readers will have gathered that the Committee had given a decision unfavourable to the Corporation and favourable to the outside authorities and the consumers generally, respecting water profits and the use of water free in the borough; and it was also intimated that an agreement with the opponents. on much the same lines in respect of gas, had been arrived at by the Corporation. The new clause affecting these matters in respect of water supply somewhat, though not in any essential particular, modifies the decision of the Committee; but the intention of the Committee stands, so that we need not go into the details. With regard to the gas undertaking, provision has been made for the borough fund to have a sort of perpetual annuity of £7500 from the gas profits; a reserve fund is provided for, up to the usual one-tenth; and the surplus revenue is to be used, as there is sufficient for the purpose, for the reduction of the price of gas. The free supply of gas for public purposes is to be discontinued; and payment for it, equally by Corporation and outside authorities, is to be not more than 10 per cent. below the price to private consumers. The definite limitation of profit available for the borough fund represents about the amount the Corporation were able to save, out of the former limitation of 6 per cent. on capital, after meeting from the amount the obligations specified in their 1886 Act. But what the consumers really gain is the value of the much-debated free gas for public purposes, the worth of which was between £7000 and £8000. Payment for the gas used for public purposes will add so much more to the surplus disposable for reduction of price. Justice has been done to the consumers. There was some little discussion on the proposed new gas-works, and the estimates for them in connection with which Mr. William Newbigging, Mr. Arthur Andrew (General Manager of the Department), and Mr. Tim Duxbury (Corporation Gas Engineer) gave evidence. The periods of borrowing were fixed by the Committee at thirty years for the gas storage works, boundary wall, and distributing mains, and ten years for stoves and meters. The questions of the profits and the rates and free gas receive notice in a leaderette in another column.

Water Bills.

There was a large amount of opposition when the Bill of the South Staffordshire Water-Works Company recently came before Lord Ribblesdale's Committee; but in the Chairman of the Company (Mr. Charles G. Beale), who is also Chairman of the Birmingham Corporation Water Committee, and in the Engineer of the Company (Mr. H. Ashton Hill), are men who, while not averse to fighting in the protection of the interests under their care, are equally capable of taking a fair view of the interests of others. So it came to pass that piecemeal as the proceedings went forward, opponent after opponent was dropped by the way satisfied with agreed concession, until, when the Committee came to consider their judgment, there was comparatively little hostility remaining. The Company supply an extensive area; and are constantly on the look-out for more water to supply to their enlarging population. They want to construct a new well and other works now; but of equal importance, so far as this Bill goes, they desire to put themselves right in the sight of the law. The Frimley and Farnborough case has opened the eyes of many water authorities to the perilous position they occupy through a misconception of their powers. For many years water purveyors have been under the impression that, when they obtained parliamentary powers to acquire land by agreement to execute specific works, they could use the land for the purpose of sinking wells. Owing to frequent disputes, Parliament has the last few years inserted a special clause in Bills, providing that, where land is acquired, it should not be utilized for the purpose of taking water without express authority. The South Staffordshire Company have for years carried out constructional work, including wells, on land that Parliament has authorized them to acquire; but having regard to the decision in the Frimley case, they now ask in this Bill for confirmation of these works. The opponents suggested that pumping in the unauthorized districts had done an infinity of harm to the agricultural interests; and that the proposed new well would cause depletion of the water supply in the area in which it is to be situated. All through, willingness to act fairly was seen to be characteristic of the promoters. For example, in the course of the proceedings (which lasted some days), they conceded a clause to the effect that, if it could be proved that pumping by the Company in any situation authorized or confirmed by the Bill, caused any diminution of the water supply from any existing well, at or after the date when the pumping commenced, they should, at the request of the owner, afford him an additional supply, and in the event of any deepening increasing the cost to the owner of obtaining a supply, the Company would pay the amount of the increase. It was not astonishing after what had happened in the way of conciliatory negotiation, that the Committee should, in the result, have found the preamble of the Bill proved. To the Staffordshire and Worcestershire Canal Company, they gave the Wolverhampton clause, with an amendment providing that the Company should not be called upon to make good any subsidence or injury, but only injuries shown to be due to their operations. It was also agreed that the onus of showing the nature and extent of any damage caused by leakage should rest upon the Canal Company.

There was no discussion before Lord Ribblesdale's Committee on the gas section of the Pontypool Gas and Water Company's Bill; and as a matter of fact, there was, as the Committee agreed, really no occasion for discussion on the water section of the measure. The Company had arrived at terms on all points with the three local authorities in whose district they operate; but the Monmouthshire County Council stepped in, and asked for unreasonable obligations to be fixed upon the Company—obligations that would have been contrary to the interests of the majority of the consumers. The Company are doing, and have arranged to do, all that can reasonably be asked of them in the matter of filtration; but the County Council wanted a clause put in giving them the right to have the questions of quality and filtration submitted to arbitration. They also desired that the pressure of the supply, where the pressure could be increased to supply at high altitudes at reasonable cost, should also be determined by arbitration. There is no precedent for the operations of a company being placed by Parliament under unknown conditions of this kind. The district is such an undulating one, that it would be anything but an economical proceeding to put the Company under the necessity at all times to send a supply of water to the tops of the houses situated at the highest parts of the district. The directions in an Act of Parliament are usually of a more specific nature. The simple declaration of the Committee that the preamble was passed, is sufficient proof that the County Council, in view of the action taken by the local authorities, had no grounds for intervening, and that their requests were unreasonable.

Gas-Firing for Pottery-Kilns.

A meeting of the English Ceramic Society was held recently at Longton, when Mr. M. Cowper-Smith, of Tunbridge Wells, read a paper on "A New Type of Furnace for Pottery Firing." He said he was aware that the idea of firing by gas had been tried for pottery, with, in most cases, he believed, very poor results. Nevertheless, he was fully convinced that the task was not by any means a hopeless one. He thought the conditions which obtained in ovens for firing pottery might be exactly copied, or even improved upon, by having ovens fired on the regenerator principle. The claims for the regenerator system, briefly, were: (1) There was a saving of 40 per cent. over the direct-fired system in fuel consumption; (2) the heat was generated where it was required, and the furnace was therefore cooler; (3) the heat could be regulated more exactly, and a more even heat maintained throughout the setting; (4) less loss of radiation, as the furnace proper contained a smaller body of fuel at a much lower temperature than in direct fires, and the smaller body of fuel required the combustion of a much less part of itself to maintain it in an incandescent state; and (5) less air was required by 50 per cent., and therefore less chimney draught was necessary, and less heat was lost up the chimney. Mr. Cowper-Smith described the regenerative setting used at gas-works for the carbonization of coal, and raised a question whether an adaptation of this would not be suitable for firing ceramic ware. The oven proposed was of a single, intermittent type. Economy would result from the chimney gases being brought into contact with the inflowing air, thus raising it to a high temperature before it was led to the place of combustion. The author pointed to the social advantages of a smokeless furnace, and suggested that arrangements might be made to have experiments carried out on the lines indicated. The experiments would not be costly, and might lead to a saving in fuel accounts of about 40 per cent. A discussion followed; and the author was heartily thanked for his paper.

It is stated that the Messina earthquake had no effect on the reinforced concrete buildings at Favelloni, in Calabria, though other structures in their vicinity were injured. These buildings were put up after the earthquake of 1905, which also had destructive results in the neighbourhood.

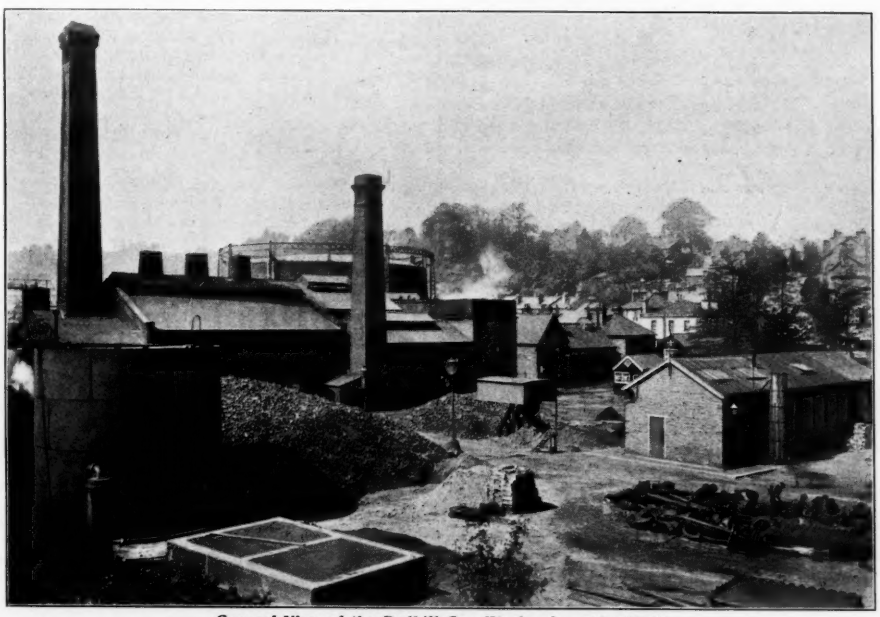
AT REDHILL AND AMONG SURREY HILLS.

GLORIOUS weather favoured the members of the Southern District Association of Gas Engineers and Managers last Thursday. It was the day of their May outing; and the programme comprised the visiting of their President (Mr. James Paterson) at the scene of his daily labours at Redhill, and subsequently a drive through the most exquisite of Nature's beauties gracing this part of Surrey.

A SINGLE ITEM OF BUSINESS.

The trip to Redhill was made both by road and rail—the bulk of the members leaving the Charing Cross Station of the South-Eastern and Chatham Railway just before eleven o'clock; and Redhill was reached about noon. Immediately on assembling at the works, the Hon. Secretary (Mr. A. F. Browne) called the members together in the Gas Company's Board Room. It was singular that circumstances should have so fallen that this one piece of business should have been transacted so near the last home of Sir George Livesey.

The PRESIDENT observed that it would be remembered that, at the last meeting in March, the Committee put before the members the matter of a contribution from the funds of the Association to the Livesey Memorial Fund. Intimation of the provisional vote, and of the confirming proposition, had been made in the notice convening



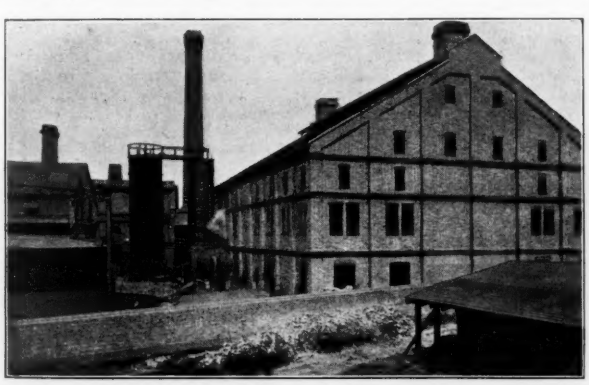
General View of the Redhill Gas-Works, from the North.

this meeting; and they had now to formally pass a resolution empowering the contribution to the fund. He therefore moved—"That, as duly notified in the circular summoning this meeting, the provisional vote of members at the March meeting to contribute forty guineas to the Sir George Livesey Memorial Fund be now confirmed."

Mr. J. W. HELPS (Croydon) seconded the motion; and it was at once unanimously carried.

INSPECTION OF THE WORKS.

This necessary item of business having been transacted, the members at once commenced their inspection of the works. But we must not proceed without a deserved acknowledgment. A compliment was paid to the President, and the members sincerely felt honoured, in that the Chairman and the whole of

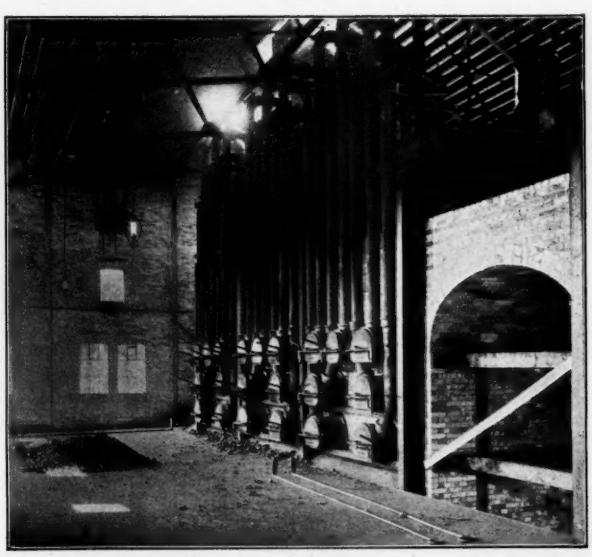


The New Retort-House, from the South.

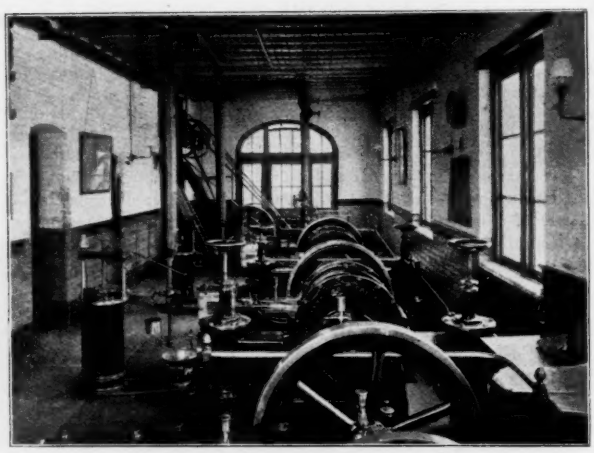
the Directors of the Gas Company came to greet and receive the visitors. The gentlemen composing the Board are: Mr. G. R. Hunt (Chairman), Mr. W. L. Stenning, Mr. S. Brooks, Mr. W. Oram, Mr. H. Stacey, and Mr. W. H. Burchell. Their presence during the morning proceedings, and their subsequent entertainment were greatly appreciated by their guests. In conducting the visitors round the works, Mr. Paterson was aided by his foreman (Mr. B. L. Welch), Mr. W. H. Peat (pupil), and Mr. W. Norris.

The works were not seen at their best. They have been during the last three years undergoing reorganization and rebuilding in parts, as opportunity has permitted. With comparatively small works of this kind, such drastic methods of carrying out change cannot be applied as in works of larger magnitude and with more space at command. As a matter of fact, under conditions such as exist at Redhill, a gas engineer has frequently to exercise greater ingenuity in effecting change and improvement than the engineer of larger works, who is in the enjoyment of more liberty. It might almost be taken as an axiom that in gas-works difficulties expand with the narrowing of limits. Thus it comes about that the condition of the Redhill works presents to the engineer to-day a combination of things modern and somewhat remote; and the arrangement is not as it will ultimately be when progress—with opportunity—is made in the work of modernization and redisposition. Knowing Mr. Paterson and the views of his Directors, this is a very safe assertion to make.

According to a little printed account distributed to the visitors by the President, the works were established in 1860; and the Company's first Act of Parliament was obtained in 1865. The



Interior of the New Retort-House.



Engine-Room—Exhausters and Blowing Engines.

works have passed through what may be regarded as the usual stages of demolition and reconstruction. The old retort-house, still in use, was built in the seventies. It is now filled with three double settings of nines, and one double setting of sixes, which were built by Messrs. Winstanley and Co., in the existing arches, in 1900. The retorts are 9 feet long, and are worked with stopped ends. An old direct-fired bench of two double beds of sevens, standing in the coal-store, is now abandoned.

The new retort-house was erected in 1906, and was necessitated by the wearing out of the direct-fired bench, and the gradual growth of the Company's business. The building is of steel framing, modelled on the lines of the new retort-house at Tottenham. The vertical stanchions are cased in brickwork, with half-brick panelling between. The building is 63 feet wide between the webs of the vertical stanchions, and was designed to accommodate whatever type of mechanical stoking might be considered advisable in the future. The floor is of steel troughing, filled with ordinary concrete, and topped with fine granite. The roof is of Somerset tiles. The retort-bench, of a nominal 500,000 cubic feet per day capacity, will accommodate six double settings of sevens, three of which are already erected, and two are at present in use. The whole house and bench can be duplicated towards the north. This, it is estimated, will give, with the proportionate addition of carburetted water-gas plant, the maximum producing capacity of the site. The settings are of a modified Klönne type, and are at present worked with a hydraulic liquor seal and tar-towers, which automatically separate tar and liquor running from the hydraulic main. At the middle of each bridge-pipe is a throttle valve, which is to be used for shutting off the retort when the settings are worked with a dry main.

The members were considerably interested in the new house and settings. There were points about them that attracted notice. Hand charging is still in vogue; the time not having yet arrived when, in the Engineer's view, machinery can be economically applied. The arrangement of tar towers and the automatic separation of the tar and liquor as it passes from the hydraulic, claimed attention. But the feature that caused general inquiry was the fact that the ascension-pipes are all of one length; so that, the retorts in each setting being at three different levels, the tops of the ascensions are at irregular levels. The arrangement was, we believe, adopted for the purpose of diminishing the trouble from stopped pipes.

The rest of the plant is of the ordinary character, including a "Standard" washer-scrubber, with vertical engine, and ample purifiers, 20 feet square. One of Dr. Colman's "Cyclone" separators was an object of interest. The carburetted water-gas plant (by Messrs. Humphreys and Glasgow) was visited. It is housed in a building adjoining the old retort-house. It consists of two sets, of 275,000 and 300,000 cubic feet per day capacity respectively. The gas is separately condensed, purified, and metered, and mixes with the coal gas at the holder inlets.

There are two gasholders—one, of 300,000 cubic feet capacity at the works, and the second, about a quarter-of-a-mile away, of a capacity of 980,000 cubic feet. The latter was erected in 1901 by Messrs. Samuel Cutler and Sons.

The sulphate plant, of an old type, by Davis, is accommodated in a building near the coal-stores; and this house fixes the limit to which the new retort-house can be extended.

The workshops—comprising carpenters' shop, mechanics and gas-fitters' shop, smithy, and engine-room—are situated on the north side of the yard. An 8 horse-power Crossley gas-engine drives a line of shafting, which is connected to the coke-breaker, forge blower (a discarded exhauster), grindstone, and lathe. The workshops were inspected; and they show that Mr. Paterson has a preference for his works being self-contained. It was noticed that the workshop buildings and the offices—all situated on a strip of ground on the same side of the works—are built of galvanized iron. The cause is not so much economy, as the fact that the land is the property of the Railway Company; and should they require this piece of ground, the Gas Company would have to give up possession.

Luncheon.

From the works the visitors walked to the Market Hall, where they were entertained at luncheon by the Chairman (Mr. G. R. Hunt) and Directors of the Company. The whole of the members of the Board were present, as well as the Mayor of Reigate (Mr. T. Gregory, J.P.). At the top table were also the President and the Hon. Secretary of the Association, and the Senior Vice-President of the Institution of Gas Engineers, Mr. James W. Helps. After lunch,

The Chairman submitted the toast of "The King."

Mr. S. Brooks proposed "Success to the Southern District Association of Gas Engineers and Managers." He expressed the extreme pleasure of himself and his colleagues at meeting the members of so valuable an organization as the Southern District Association of Gas Engineers and Managers. He believed this was the first time the members had honoured the Company with their presence in the town. Probably he should not be far out if he attributed their presence now to the fact that the Engineer and Manager of the Redhill Gas Company had been honoured by being elected to the office of President. It was an honour Mr. Paterson fully deserved. In addition to his mental culture, their Gas Manager possessed an accurate theoretical knowledge of the complex business relating to the manufacture and distribution of illuminating gas, as well as a practical knowledge of the methods in use, and of the ways to work economically. With regard to the visit that day, the Directors of the Company did not pretend they had much to show the members. The experience and knowledge of their visitors of the gas-works throughout the country was very great; while it was not a large population the Redhill Gas Company catered for. They did very well, however, for the shareholders and for the consumers. The objects the Association had in view were to maintain the gas industry, to improve its methods, and to carry on the work both economically and efficiently. In these days, they were faced with rivalry—rivalry which presented itself sometimes, he could not help saying, in improper guise—that was to say, municipalities undertook large trading schemes from which they expected, or rather deluded the ratepayers into expecting, large profits—profits which simply went into the pockets of the financial corporations who lent the money. In Reigate, they had suffered from municipal trading in electric light; and the only advantage, or whatever else it might be suitably called, consisted in paying extra rates for the enjoyment of the few. (Laughter.) It was a sorry condition of affairs that those who did not use the electric light should have to pay for those who did. He believed that they would survive this kind of thing, and that out of the evil of municipal trading good would come to private enterprise, by the stopping of such municipal venture. If the trading were undertaken by men who knew about these things, there would not be much objection. However, he strongly expressed his approval of the Association and its proceedings. He for one was quite content to leave technical work in the hands of men professionally equipped for carrying it on. Most heartily, therefore, he proposed success to the Association; and he hoped the welcome of the Chairman and the Board would be accepted in the spirit in which it was extended to the members.

The President, in the course of his response, thanked the Chairman and Directors very cordially, both for himself and the Association, for the toast that had been proposed, and the hearty manner in which it had been presented. He should like to tell his professional colleagues that the words of Mr. Brooks not only echoed his feelings and those of his colleagues at the moment, but they could be applied to the attitude of the Board for as many years as he (Mr. Paterson) had been at Redhill—that was to say, for the last six years. He was pleased indeed to think, and proud to know, that the whole of the Board were present at the luncheon. He was proud, too, to remember on this occasion that, whenever any technical point had been brought up by him at the Board meetings, it had been met by an unfailing kindness. Most of those present knew that at times technical—sometimes financial—difficulties did occur; and personally he was grateful to his Directors for the way in which they received the troubles it was his duty to bring before them. He found it was a desirable thing to bring one's difficulties, as well as one's successes, into the Board room. This was the one way in which success could be achieved. There was one trouble to which he referred in his presidential address, and that was the leakage from the joints of the steel main that he laid some time since. He brought this matter before his Directors, having passed some uncomfortable nights thinking over the matter; and he was astounded and overcome by the way in which his trouble was received. There was nothing but sympathy with, and thought for, their Engineer in his trouble. The loss of gas was put into the background; and the first consideration of the Directors was their Engineer's solicitude for the welfare of the Company. However, he had also to thank the Chairman, Mr. Brooks, and their colleagues for their kind reception. When he (the President) spoke of the visit to the Board some time ago, they received the idea with enthusiasm; and the Association were deeply grateful.

Mr. Stenning said, as gas managers and engineers and directors, they were all equally interested in the success of the districts in which they lived and had their undertakings. All commercial undertakings were more or less governed by their locality. If the locality prospered, the gas company prospered. Though the Redhill Corporation had done things that were detrimental to the interests of the Gas Company, they had done their utmost to popularize the neighbourhood. In their Mayor, they had a gentleman who had graduated successfully in the school of commercial enterprise, and they were glad to think he had come to spend his days of retirement and rest among them. It was to his credit, too, that he had come forward to take up the arduous duties of municipal work. He proposed the toast of "The Mayor and Corporation of Reigate."

The Mayor (Mr. T. Gregory), in reply, thanked the members for their reception of the toast; and, on behalf of the Corporation and himself, welcomed the Association to the borough. He was proud of the borough and its surroundings. The Corporation had gone into municipal trading, but he did not believe in municipal trading of any sort. There were things that were best left in the hands of private enterprise. The interest of councillors was not the same as the interest of those making the best of a private enterprise. He did not

think that anything in this way could be done as cheaply by corporations as by private concerns.

Mr. J. W. HELPS proposed "Prosperity to the Redhill Gas Company." He remarked that it was with great pleasure he did this, because he had the privilege of knowing some of the Directors. He was sure the members would wish him to, in the first place, say how sincerely they appreciated the honour the Directors had done them in inviting them to Redhill. He was sure the policy of the Gas Company in having good men on the Board, and good men as officers, would receive its reward. His own brother was once the Manager of the Company; and his experience of the Board was precisely that of Mr. Paterson. Under the management of Mr. Paterson, there was nothing but continued progress for the Company.

The CHAIRMAN, in reply, expressed the pleasure it had given him and his colleagues to have the Association with them that day. As a small Company, he thought they did do their best not only for the shareholders but for the consumers. In Mr. Paterson, they were fortunate in having a good practical man; and his election as President of the Association was an honour to the Company.

THROUGH PICTURESQUE COUNTRY.

The members spent the remainder of the afternoon in an enjoyable drive through the picturesque surroundings of the town. Leaving the Market Hall, they followed the main road between Redhill and Reigate, then drove to the top of Reigate Hill, through the uplands of the North Downs, and past the village of Lower Kingswood, then across Walton Heath, passing on one side the village of Walton-on-the-Hill. Going in a southerly direction, the top of Pebble Coombe or Pebble Hill was reached; and ultimately the top of Box Hill. The views *en route* were beautiful; and even at the end of the drive—which was at Burford Bridge Hotel—the scenic charms of the locality, it was found, had not been exhausted. At the hotel, tea was served; and it was welcome, after the drive. Before leaving the table, on the suggestion of Mr. W. E. Price, the members made acknowledgment—as it was richly deserved—of the work of the President and the Hon. Secretary in making the arrangements for the day, in the enjoyment of which there had not been a single flaw. An hour or so was spent in the lovely grounds of the hotel, and then the visitors wended their way to Box Hill Station, from which they were soon homeward bound.

NEW MEDIUM SIZE INVERTED BURNER.

IN arranging for burners for the lighting of a room or any other interior, the chief matter for consideration is the illuminating power at each point of lighting that is most suitable for requirement. There is another matter that needs consideration, and it is that the best artistic effect should be obtained by selecting burners bearing some proportionate relationship with the fittings used. Really there is nothing more grotesque than to see a full-sized inverted burner depending from a small size and slender fitting, or the bijou form of inverted burner attached to a heavy and substantial fitting. There are, for example, many three-branched pendants already in use, too light for three heavy ordinary size inverted lamps, and yet upon which three bijou burners would be insufficient. Effect is lost in disproportion. On the other hand, there are specially designed fittings for both forms of burners. Hence, and for meeting the lighting requirements of many situations, a size of burner (say) midway between the ordinary and the bijou, should command a ready sale, and for domestic use have considerable application. In their series of "Forward" burners, Messrs. Ingram and Kemp, Limited, of Birmingham, have introduced a burner such as is referred to; and we have had an opportunity of seeing its effect (at their London show-rooms, No. 30, Brook Street, Holborn) attached to some of the choice designs of fittings, following the arts of various periods, for which the firm have made a reputation.

This new intermediate size burner consumes about 2 feet of gas an hour, and gives a light of approximately 50 candles. From the constructional point of view, the lamp follows the lines of the previous "Forward" burners as described on Sept. 15 and April 6 last, including mixing-chambers, air and gas regulators, and other features that make for efficiency. The burner is supplied with a fancy hood, with opening on one side only, to protect from discoloration the fitting from which it is suspended. Inside the hood, there is a lining of special white metal, which is not affected by heat or the products of combustion, and therefore there is no inconvenience from any accumulations of deposit. Another point is that the top part of the burner has been designed so that there is no severely apparent junction between burner and fitting—that is to say, there is no sharp outward expansion of the burner from the fitting. The head of the burner is given a gradual ornamental curvature, so that to the eye there is a continuity in design between fitting and burner. Little points make for perfection in art, and therefore in effect. The aim, or rather one of the aims, has been not to allow the burner to detract in any way from fittings of classical type. The "Forward" burner, in the new size, will command attention. It is not quite ready for supply. But samples have been made, so that the effect may be seen upon various types of fittings in the firm's show-rooms. Those who make an inspection will concede that usefulness and effect are tastefully blended.

PHOTOMETRIC UNIT AGREEMENT.

IN forwarding the subjoined memorandum as to photometric units, Dr. R. T. Glazebrook, F.R.S., the Director of the National Physical Laboratory, says: "An important announcement with regard to the photometric units maintained at the Bureau of Standards, America, the Laboratoire Central d'Electricite, Paris, and the National Physical Laboratory, Teddington, has been issued by the Bureau of Standards in their Circular, No. 15, dated April 1, 1909. It was at first intended to make this announcement simultaneously in America, France, and Great Britain; but circumstances prevented this. It is desirable, however, to state authoritatively that the agreement described in the memorandum has been arrived at, and has the approval of the Gas Referees; and that the photometric standards of the National Physical Laboratory are being maintained in accordance with it."

NATIONAL PHYSICAL LABORATORY.

Memorandum as to Photometric Units.

In order to determine as accurately as possible the relations between the photometric units of America, France, Germany, and Great Britain, comparisons have been made at different times during the past few years between the unit of light maintained at the Bureau of Standards, Washington, at the Laboratoire Central d'Electricite, Paris, at the Physikalisch-Technische Reichsanstalt, Berlin, and at the National Physical Laboratory, London.

The unit of light at the Bureau of Standards has been maintained through the medium of a series of incandescent electric lamps, the values of which were originally intended to be in agreement with the British unit; being made 100/88 times the Hefner unit.

The unit of light at the Laboratoire Central is the bougie decimale, which is the twentieth part of the standard defined by the International Conference on Units of 1884, and which is taken, in accordance with the experiments of Violle, as 0·104 of the Carcel lamp.

The unit of light at the Physikalisch-Technische Reichsanstalt is that given by the Hefner lamp burning at normal barometric pressure (76 cm.) in an atmosphere containing 8·8 litres of water vapour per cubic metre.

The unit of light at the National Physical Laboratory is that given by the 10-candle power Harcourt pentane lamp burning at normal barometric pressure (76 cm.) in an atmosphere containing 8 litres of water vapour per cubic metre.

In addition to the direct intercomparison of flame standards carried out recently by the National Laboratories in Europe, one comparison was made in 1906 and two in 1908 between the American and European units by means of carefully-seasoned carbon filament electric standards; and as a result of all the comparisons, the following relationships are established between the above units. The pentane unit has the same value within the errors of experiment as the bougie decimale. It is 1·6 per cent. less than the standard candle of the United States of America, and 11 per cent. greater than the Hefner unit.

In order to come into agreement with Great Britain and France, the Bureau of Standards of America proposed to reduce its standard candle by 1·6 per cent., provided that France and Great Britain would unite with America in maintaining the common value constant, and with the approval of other countries would call it the "International Candle." The National Physical Laboratory, London, and the Laboratoire Central d'Electricite, Paris, have agreed to adopt this proposal in respect to the photometric standardization which they undertake; and the date agreed upon for the adoption of the common unit and the change of unit in America is April 1, 1909. The following simple relations will therefore hold after that date:—

Proposed new unit = 1 pentane candle.
= 1 bougie decimale.
= 1 American candle.
= 1·11 Hefner units.
= 0·104 Carcel units.

Therefore, 1 Hefner unit = 0·90 of the proposed new unit.

The pentane and other photometric standards in use in America will hereafter be standardized by the Bureau of Standards in terms of the new unit. This, within the limits of experimental error, will bring the photometric units for both gas and electrical industries in America and Great Britain and for the electrical industry in France to a single value; and the Hefner unit will be in the simpler ratio of 9/10 to this international unit.

The proposal to call the common unit of light to be maintained jointly by the National Standardizing Laboratories of America, France, and Great Britain the "International Candle" has been submitted to the International Electrotechnical Commission, and through it to all the countries of the world which are represented on that Commission.

It is hoped that general approval will be secured, and that in the near future the term "International Candle" for the new unit will have official international sanction.

THE SEASON'S NOVELTIES AT JOHN WRIGHT AND CO.'S.

A CHAT with the powers that be in John Wright and Co., always leaves one with the impression of a firm having long views ahead. It is not sufficient to meet the requirements of to-day. Some new demands must be foreseen; others must be created; and all must be catered for. A new trend in any direction must be realized in its earliest beginnings. If the demand for one class of article shows the slightest prospect of falling off either through the supply being sufficient, or the public taste changing, or a newer type coming in, there must be no stopping to "flog a dead horse," still less to lament it. The closing of one door simply means that other two must be quickly opened. "What was good enough for our predecessors is good enough for us," is a stultifying maxim that finds short shrift with manufacturers holding views such as these. So far from entertaining any idea that the last word has been said in the development of gas-consuming apparatus, Messrs. Wright express a breezy confidence that the opportunities of fresh advance were never anything like so great as they are to-day.

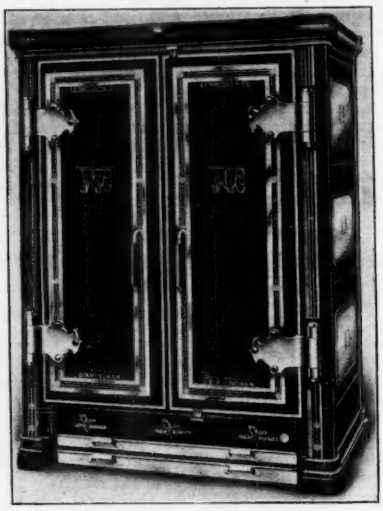
Dealing, first of all, with domestic cooking by gas, this has had a long innings; and yet its wide popularity has, until now, been due entirely to the propaganda carried on by the gas authorities and the gas-stove makers, single-handed, without any special help from the building trades, for example. Messrs. Wright are firmly convinced that, in view of the recent great advances in gas-consuming appliances, the dwelling-house of the future ought to have fitted throughout it gas-consuming apparatus for cooking, hot-water supply, and heating, and that not merely in a makeshift fashion, as an afterthought in existing houses, but fitted into new houses designed with special provision for them. With this idea in view, and believing the time has come to claim the attention and co-operation of the building interest, Messrs. Wright have prepared two pamphlets—one entitled "Domestic Heating," appealing to architects on grounds of hygiene and æsthetic progress; the other (which has already been noticed in our columns), "Hints on House-Letting," a persuasive to the building trade from the point of view of utility and economy. The two brochures form part of a series which Messrs. Wright are this season issuing—each making its appeal to a distinct class. There is a pamphlet addressed to medical men, to which reference will be made presently; there is another written for school authorities, with a view to ensuring that the young idea shall be taught not only how to cook, but how to do it by gas. Another of the series is intended for householders generally, and, besides emphasizing the merits of gas for cooking, it makes an outstanding feature of the domestic supply of water heated by gas in conjunction with gas cooking—a direction in which progress has been exceedingly slow, and really serious developments, as yet, very recent and very partial.

While the cooking and hot-water requirements of the householder have been handled in this way, the other great domestic use of gas-heating—viz., for warming purposes—has had special treatment also. The position Messrs. Wright have taken in the designing and perfecting of fresh gas-heating apparatus is a matter of common knowledge; and their further developments in the way of increased laboratory accommodation and chemical staff, give sufficient promise of the further forward movement they at present contemplate.

Yet another aspect of the gas consumption problem has occupied much of Messrs. Wright's thought and effort, particularly in recent times—viz., gas-heated apparatus for various trade and manufacturing purposes. It is true that for many years past a certain amount of apparatus of this kind has been made; but in too many cases this has been done on the old lines of stocking certain apparatus which the public might either buy or leave alone, as they felt disposed. There has been but little vigorous propaganda in recent times to educate manufacturers generally in the usefulness and economy of gas-heated apparatus for their requirements, and, speaking generally, far too little effort to study these requirements and make a complete range of apparatus expressly contrived to meet them. In the comparatively familiar department of hotel cooking apparatus, there seemed ample scope for newer methods, and in other directions fresh outlets had to be thought out and fresh classes of users got at.

Treating their previously existing range of such apparatus merely as a starting point for their new departure, Messrs. Wright have within the last year or so created an entirely fresh class of plant of this kind, in which a great variety of users have offered to them precisely the kind of apparatus they specially need. Hotels, restaurants, and boarding-houses, for example, are all catered for; but it is recognized that each of these classes has special requirements of its own, and so different appliances are available for each. For hotels and large restaurants there are a variety of carving tables and hot-closets, in which the oldest experience and the newest methods make common cause in producing a range of gas-heating apparatus that will do everything that the best steam-heated appliances can do. They are made in various sizes—from a table that will keep hot a single joint, to an extensive apparatus that will take all the dishes contained in the elaborate bill-of-fare of a modern restaurant. They are all conspicuous for one or another of those little refinements of convenience which commend an apparatus to the enthusiastic appreciation of every chef who prides himself on his business. For example, the bottom plinths both front and back are recessed, so as to give easy access for carver and server.

For hotels, there is also the "Rostrum" roaster and baking oven, in which, by a number of excellent contrivances, the utmost economy of gas is made compatible with the quickest and most



The "Rostrum" Gas-Heated Baking Oven.

complete results. Again, a particularly effective example of what the newer ideas can effect in a large and yet compact form is the "Centaur" gas-heated central range, which has four independently controlled roasting ovens; hot-closet, bain-marie, and hot-

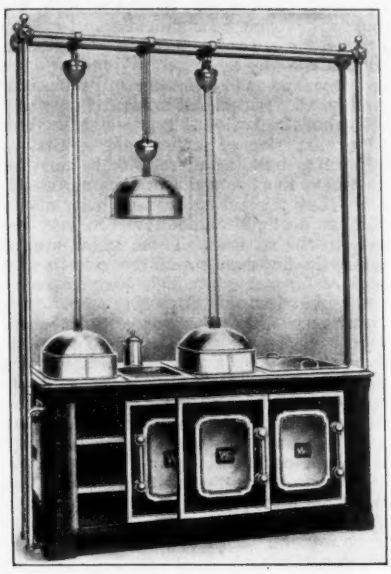
The "Centaur" Central Gas-Cooking Range.

plate, all combined in an apparatus measuring 10 feet by 5 feet and only 3 feet high. All the products of combustion are led into one central flue; and the apparatus can be placed in the middle of the floor with access from every side.

The "Cito" Combined Hotel Griller and Hot Closet on Stand.

Suitable also for hotels, but peculiarly adapted for restaurants, is the "Cito" series of combined grillers and toasters. These

have every modern contrivance for convenient working, and arrangements also for heating the accompanying hot-closet by waste heat from the griller, or, if necessary, utilizing the waste heat for boiling purposes. This apparatus may be had in a range of some half-dozen different forms, and with or without stand or hot-closet. Not only for restaurant purposes but also for clubs, schools, and large works' mess-rooms, the "Cito" is proving itself much in demand.



The "Sector" Carving Table, Bain Marie, and Hot Closet.

Another apparatus invaluable to restaurateurs is the "Friar." This is an appliance intended for frying fish. The deep cast-iron frying pan fits closely at its rim to the edge of the outer case, which contains the burners; and an ingenious water-lute arrangement all round ensures against the slightest risk of fire and overflow of melted fat on to the burners, and also against the flame or fumes rising to where the food is placed. There are covers to protect the taps against any falling grease; and condensation is provided against.

The innumerable boarding-houses throughout every visitors' resort are in the awkward position of having more cooking to do than ordinary domestic apparatus can cope with, and yet not sufficient to call for the large apparatus used in restaurants and hotels. An apparatus expressly designed for this very large class of consumer is the "Bordo," which has a larger oven and hot-plate than any ordinary domestic gas-cooker, and yet is kept within such moderate dimensions that it may be said to do the extra work without taking up extra room. The smallest size is arranged to cook a dinner for fifty persons. The "Bordo" has all Messrs. Wright's well-known features of removable parts, and entire interchangeability throughout. The oven and hot-plate come apart by undoing a few screws.

Gas-Heated Stock-Pot.

A gas-heated soup-boiler with a flue which carries off both the steam and the products of combustion, and also a gas-heated stock-pot of somewhat smaller dimensions, but similar construction, are also prominent in the new class of goods. These are arranged so as to be fitted up in batteries of any number.

The "Hotwell" Low-Pressure Automatic Boiler.

Many hairdressers' establishments have already appreciated the compactness and usefulness of the "Hotwell"—a gas-heated automatic low-pressure boiler, which, with a minimum of cost, can be connected up to give a continuous supply of hot water through the existing delivery taps. The apparatus has Wright's patent automatic gas-valve, known in connection with other of their apparatus; and by this means the gas consumption is kept at the lowest amount necessary to give water at the desired temperature. The "Hotwell" fixes on a light bracket against the wall. Its boiler is of copper, and the material and construction are such that the apparatus is practically indestructible.

In creating this new range of goods, the requirements of bakers and confectioners have not been overlooked; and it is claimed for the "Victor" gas-heated confectioners' oven that—while as simple and cheap to instal as a coal-oven, and as easily controlled as a steam-oven—it is more economical than either. In searching tests made by a leading confectionery expert in the Midlands, it was found to bake four tiers of pastry quicker and better than the expensive steam-ovens formerly used; and it was equally effective when set to bake two tiers only—every article being simultaneously browned to an equal degree. In the "Victor," the products of combustion do not get inside the oven, but are led all round; and at the same time the design is such that this arrangement, so far from using more gas than otherwise, leads to an actually reduced consumption, compared with many earlier types.

The "King Alfred" Bake-Plate on High Legs.

A further apparatus for bakers' use is a series of bake-plates, either on a low stand or on high legs, intended for baking muffins, crumpets, pikelets, &c.; and when one learns that among the articles it is meant to bake oat-cakes are included, one appreciates the appropriateness of the title given to the apparatus—viz., the "King Alfred." The "King Alfred" is also being used with much acceptance in brass works for lacquering purposes, and by manufacturing tobacconists as a drying plate—the necessary adaptation being made without any extra charge. For brass works and other establishments where japanning is carried on, Messrs. Wright have further improved their well-known series of gas-heated japanning ovens.

USES OF GAS AT WOOLWICH ARSENAL

As Seen by the London and Southern Junior Association.

The last of the visits for the present session of the London and Southern District Junior Gas Association was arranged to take place last Wednesday; and considering that it was a mid-week fixture, there was certainly a very good muster of members. That all those who were able to attend should have done so was not, however, surprising; for the visit was to Woolwich Arsenal, and, in addition to the generally interesting operations that are carried on in this important national establishment, it is well known that extensive use is made of the properties possessed by gas as a heating agent.

It had been explained to the authorities by the Hon. Secretary (Mr. J. G. Clark) that the special object of the Association in desiring to visit the Arsenal was to see the different methods and operations in which gas is employed; and the programme of the afternoon was accordingly drawn up with this object in view. There are probably few people who are not subject to fascination by those engines of destruction upon which, in the never-failing hands of her sons, the British Empire has had in the past, has now, and no doubt will also have in the future, to rely to so great an extent for her safety. And of these few it is pretty safe to hazard that none were to be found among the visitors last Wednesday; for in the course of the tour many a furtive glance was cast in directions which were not included in the itinerary. However, no wandering into bye-paths was allowed by the lynx-eyed cicerones. Gas was what the members had come to see; and gas, they should see. And so they did. Both ordinary coal gas and producer gas they saw harnessed to the needs of man, and performing the hardest of tasks with a smoothness and an efficiency which won universal admiration. But though gas was thus kept ever in the foreground, it was, towards the close of the inspection, shown in connection with operations which appealed to both the professional and the martial instincts of the members. Like the playwright and the novelist, the Arsenal authorities had kept the most striking "situations" until the last. Aware, as everyone connected with the industry is, how much has been done by Mr. A. W. Onslow, the Engineer and Manager of the Arsenal Gas-Works, in the direction of the application of high-pressure gas to manufacturing purposes, the members would no doubt have liked to have made a visit to him personally part of the afternoon's arrangements; but as events proved, a full programme had been mapped out for them, without the inclusion of an inspection of the gas-works.

On arrival, the members were split up into six or seven parties of about ten each; the different groups being distinguished by various letters of the alphabet which were borne along in front of them on the top of poles. This is an excellent method of dividing up a large number of visitors, and ensuring that everyone sees all that is to be shown. Precisely at the hour appointed, the first party (which included the President, Mr. W. J. Liberty) were led off; and they were followed at short intervals by the remaining ones. The route taken was from the main gate, through the brass foundry, the rifle shell factory, the scrap furnace house, the thermal house, the radial crane house, and the west forge, back to the main gate.

In the brass foundry, there are ten regenerative furnaces fired with producer gas, which is passed direct from the producers to the furnaces; while the visitors were next shown coal gas under a pressure of 72 inches, used in a furnace for the thermal treatment of steel. In front of this furnace was a Féry pyrometer, which was recording a temperature of about 970° C.; and this could be increased to 1400° C., if required. Then, again, were seen a series of low-pressure producer gas furnaces which are employed in connection with shell forging. After this, as was only fair, coal gas had another turn—that is to say, in the scrap forge shop. Here there are two horizontal high-pressure coal-gas furnaces, each about 30 feet long and less than 3 feet high, with a row of burners from end to end, which are used for heating iron bars to make springs. In the first of these the gas only is supplied under pressure of about 100 inches; while in the second both gas and air are compressed—mixing in the delivery pipe, and taking in a further supply of air at the furnace. The flame impinges upon the metal, which when ready is drawn out and coiled into springs. Coal gas was also seen employed in the thermal house, where there is a vertical high-pressure furnace, with three rows of three burners and one row of four. This is used for hardening axles. It holds from 6 to 8 cwt. of metal at a time; and can be heated up to a temperature of 800° in an hour.

After this, the members were destined to see further operations carried out by producer gas; and it was in this portion of the visit that the universal interest in both gas and guns could be wholly satisfied at one and the same time. The radial crane house is so called because there is in it a crane which travels from the centre right round the building. This crane in itself is of interest—lifting as it does with the present wire ropes 125 tons, or with chains about 250 tons. The utmost it is now called upon to lift is, however, considerably less than the former of these two weights. There are in this house a dozen and more furnaces fed with producer gas; there being both induced draught and air supplied under a pressure of 15 lbs. to the square inch. In the largest of these chimney-shaped furnaces there was, at the time of the inspection, a tube for a 12-inch gun, some 53 feet long, and weighing 24 tons, which was being tempered by subjection to a temperature of about 1750° Fahr. The operation was just on the point of completion when the members arrived (the authorities having doubtless thoughtfully timed the arrangements with this object in view); and they saw the crane lift the tube some 20 feet or so, after which the whole front of the furnace was opened, and the tube was shifted from its position, and promptly dropped into a well of rape oil. After this bath, the tubes are again removed to the furnace for annealing. In the case of this particular furnace, the gas comes into contact with the outside of the metal; and all the way up there are doors or dampers which can be opened at will so as to admit air and thus secure the heat at any required point. If the heat is needed only at the top, the air is shut off from the bottom. Some eight or ten hours are occupied in the tempering of such a tube as the one just mentioned. In the same building there is to be seen another type of furnace, in which the flame does not come at all in contact with the metal—thus preventing the possibility of any oxidizing action, beyond the negligible amount which may be caused by the air already in the furnace. These latter are called spiral furnaces, because the flue runs round the side in spiral fashion. With this type of furnace such high temperatures cannot be attained as with the first-named pattern—only from 1300° to 1400° Fahr., as compared with about 2500° Fahr. where the flame impinges directly on the metal. This difference is, of course, accounted for by the brickwork through which, in spiral furnaces, the heat of the gas has to pass before reaching the metal. For the same reason, a much longer time is required to get up heat in them. The temperatures of the furnaces in this house are taken by means of thermo-couples with Roberts-Austin recorders, which give a complete record, half-a-mile away from the furnaces, of every minute of the twenty-four hours. The temperature is recorded from three parts of the furnace—the top, bottom, and centre.

The west forge was the last place to be visited; and here low-pressure producer gas is used in the furnaces. The inner tube of a 9·2 inch gun, weighing 14 tons, was lifted by hydraulic apparatus from one of the furnaces, and placed under a hydraulic press capable of working up to 3000 tons, where the members saw the operation of forging carried on.

The parties were then conducted back to the main gate; and everybody left the Arsenal thoroughly pleased with his afternoon's experiences.

Association of Gas Managers of Holland.

The annual general meeting of this Association (the 37th) is to be held at Utrecht, on Wednesday and Thursday, the 7th and 8th of July, under the presidency of Heer J. E. H. Bakhuis, the Manager of the Hague Gas-Works. The programme of the proceedings comprises, in addition to the private business, the presentation of the reports of the Technical Committees appointed by the Association, of which the more important are those dealing with: (1) Photometry; (2) Coal; (3) Training of Gas-Fitters; (4) Standard Conditions for the Purchase of Gas Oil. There are twenty-six technical questions set down for discussion. Of these questions, three will be introduced by the reading of short papers; while the remainder are merely topics on which members will be invited to give their views. In the course of the meeting a visit will be paid to the Utrecht Gas-Works.

Electricity Works and Steam, Gas, and Oil Engines.—At a recent meeting of the Institution of Electrical Engineers, Mr. A. J. J. Pfeiffer read a paper in which he gave a description of the Diesel oil-engine, and then made some comparison of the capital and the operating cost of steam, gas, and oil plants respectively in electric power stations to deal with a maximum load of 1600 kw. He quoted figures to show that the difference in capital outlay on high-grade plants of the three kinds was nominal, and said that the limit of application of the Diesel oil-engine principle depended primarily upon relative fuel costs, which for Great Britain would mean that it probably cannot compete with steam or gas engines in the immediate neighbourhood of coal centres. He added, however, that, where coal was dear, oil possessed great advantages over both the other systems from the point of view of working costs. The author remarked that an oil-engine plant burning crude petroleum of about 18,500 B.Th.U. per pound had a thermo-dynamic efficiency far exceeding that of a steam or gas plant; and this efficiency remained practically constant over a wide range of units. The type of engine he was dealing with could burn almost any liquid fuel; but generally, and especially in Great Britain, petroleum residue from the Dutch East Indies, Texas, and Roumania was used, while on the Continent gas oils and paraffin oils were successfully employed. Of late, a new source of oil fuel had been found—and that was gas plants. Carburetted water-gas plants, of which there were a large number in Great Britain, gave off an oil tar as a bye-product which lent itself admirably as oil-engine fuel, having a calorific value of about 16,500 B.Th.U. per pound. Such fuel oil had already been used for some time past on the Continent in connection with Diesel oil-engines. Then, again, among the bye-products of a retort-gas plant using bituminous coal was a tar oil containing asphalt, which had to be removed before the oil could be employed.

IRON—ITS OXIDATION, CORROSION, PROTECTION

By Mr. W. Cranfield.

[A Paper read before the Yorkshire Junior Gas Association, May 15.]

While the noble metals—gold, silver, and platinum—remain practically unaffected on exposure to air, provided no other agency is at work (*e.g.*, sulphuretted hydrogen in the case of silver), the baser metals—iron, copper, lead, zinc, &c.—exposed to air acquire a superficial coating, and lose their lustre. In the case of lead and zinc, this thin film is coherent and impervious; consequently it completely protects the metal from further corrosion. If the skin is damaged, it is quickly replaced, and no further encroachment of air action ensues. Artificial protection is thus unnecessary. On the other hand, iron, which much more rapidly corrodes, forms a porous mass of rust, instead of a coherent coating. This porous structure can easily be demonstrated by seeing how a hydrocarbon oil makes its way through the mass if put on to dry rust. On this circumstance depends the well-known device of first saturating rust before scraping it off. Whenever iron is exposed to air and water, this corrosion proceeds; so that even when embedded or covered up—unless in non-porous materials—little protection is afforded. Girders, &c., embedded in brickwork, masonry, or mortar, all rust; while nails driven into wood are rusted by the moisture in the wood.

Rust, being porous, leaves the metal below it still exposed to the rusting conditions; so it may be said that rust produces rust, though, of course, rust is not the actual chemical agent of the operation. All porous bodies have the power of condensing or occluding gases; and rust does this with oxygen and carbon dioxide. Moreover, it can absorb and retain water; so we have here the most favourable circumstances for the continuous production of rust, and rapid progress of this action must ensue. This continuous development of rust is the most serious phase of the question; and to it is due the complete corrosion of screws and rivets in iron structures, and the fact that pipes may become so completely converted into rust that they either fall to pieces of their own accord or can easily be broken up. Occasionally one hears of small mains and services that exist as pipes in the imagination or on plans, rather than in sober reality. They retain their form and allow gas to pass along them; but gas also passes through them and swells the unaccounted-for gas total.

When continuously exposed to water, rusting varies according to the amount of oxygen (and carbon dioxide) present. Thus boilers in constant use do not rust on the inside, because the continuous boiling of the water expels the dissolved gases. Since, however, the feed water is constantly introducing fresh quantities of oxygen, it follows that rust may form at the water-line, because here we have both water and the necessary gases. Similarly, the interior of hot-water pipes does not rust, as the circulating water soon becomes air-free. Iron rusts much more rapidly when intermittently exposed to water than when continuously immersed, and mainly between the varying levels of the water in which it is standing. This at once calls to mind the corrosion of that part of the lid of a gas-purifier adjacent to the water-level in the lute. A short shower of rain causes more rusting than a whole day's immersion in water. The thin adherent film of water is in contact with air; and as fast as its dissolved oxygen is used up in rust formation, a fresh supply is absorbed from the air. The water thus remains saturated with it, whereas the deeper layers of a mass of water can only very gradually renew their lost oxygen. Then, too, the raindrops, during their passage through the air, have had the opportunity of becoming saturated with oxygen and carbon dioxide.

As has been mentioned, if the coating of rust were impervious and coherent, it would itself be a defence against further corrosion. Several processes are in use for the forming of such a layer of oxide on iron, only it is not the sesqui-oxide of red rust, but the tri-ferric tetroxide (Fe_3O_4) that is produced. Such operations mainly consist of strongly heating and thus burning the surface, or heating the iron object in superheated steam. These devices are more suitable for small articles than for the iron of gas-works structures. This is commonly known as the "browning" of iron; and Barffed iron is perhaps the best known instance. For small articles not likely to get violent treatment, this is fairly satisfactory, only as the film is but thin any chipping prepares the way for eventual rusting.

Wherever iron is in contact with iron, rust readily forms. It is often overlooked that such places are in an eminent degree favourable for its formation; being more or less inaccessible to scouring treatment and to paint, out-of-sight and consequently unexamined, and offering facilities for the retention of water. An almost imperceptible space between a rivet-head and the iron plate is sufficient to admit water, and thus originate and maintain rusting, so that in course of time the rivet may be entirely eaten away. The rusting of a few rivets may not endanger a structure provided that plenty of others are sound; but where some are affected, many others exposed to the same conditions will probably have shared the same fate. The stability and soundness of an iron structure are more imperilled thus than by corrosion of the more massive and visible parts. Besides, unsoundness of joints in ironwork on a gas-works commonly means gas leakage; and rivet holes are just the commonest places for this trouble. A word of warning may here be given. Whenever iron bolts are embedded in stone, rusting conditions must be avoided, as the increase in bulk caused by rusting has split many an otherwise sound stone and loosened the bolt. The use of mortar instead of lead in such cases is inadmissible, being porous. Rust once formed in such a situation greedily absorbs moisture from the mortar, and corrosion proceeds apace. Cement and concrete, being non-porous, actually preserve iron; and ironwork is sometimes effectually preserved by being painted with a thin gruel of cement. Ironwork in reinforced concrete similarly remains uncorroded.

The Chemistry of Rusting.

The rusting of iron was at first, and for a long period, regarded as a simple process of oxidation. The explanation generally accepted for the past thirty or forty years is chiefly based on the experiments of the late Dr. Crace Calvert, F.R.S., as amplified and interpreted by Professor Crum Brown, F.R.S., of Edinburgh. Iron is supposed to rust through the combined action of the oxygen and carbon dioxide of the air in the presence of water; the carbonate and bi-carbonate of iron first formed being gradually converted by the further action of atmospheric oxygen into a ferric hydroxide. Professor Crum Brown summarized these charges into the following equations:—

$$4\,(Fe + H_2O + CO_2) = 4\,FeCO_3 + 4\,H_2.$$

$$4\,FeCO_3 + 6H_2O + O_2 = 2\,Fe_2\,(OH)_6 + 4\,CO_2.$$

The carbon dioxide thus liberated is then able, in the presence of water, to attack a fresh surface of iron under the porous coating of rust, and start the same cycle of changes again. The well-known action of alkalies in inhibiting the rusting of iron was thus explained by their power of absorbing carbon dioxide, without which rusting could not occur.

These conclusions, though probable and apparently adequate, have not received universal and unreserved acceptance, and other workers have strongly differed among themselves as to the accuracy and validity of the fundamental experiments—doubts having been often expressed as to whether other experiments had not proved the possibility of rusting under conditions which excluded all carbon dioxide. It is striking how often the common phenomena of every-day life and their chemical explanation remain not fully understood. Nature still seems to put under our very noses the things she wishes to hide from us, and is too often successful in so doing. Flame is still a subject fraught with possibilities of further discovery; and most of us remember the general incredulity that greeted the preliminary announcement, in 1894, that Lord Rayleigh and Professor Wm. Ramsay had discovered a new constituent of the atmosphere amounting to 1 per cent. of its volume. As Professor Armstrong recently said concerning the explanation of rust formation, "It is not creditable to chemists that problems of fundamental importance should have been so long neglected in favour of work of no particular value to anyone, and that it should still be possible to dispute on such questions."

The most valuable and convincing work of recent years has been that carried out by Dr. G. T. Moody at the Central Technical College, South Kensington. Professor Armstrong, who saw the work during its progress, testifies to Dr. Moody's extreme patience, care, and absence of bias, and considers the result beyond question. Dr. Moody's experiments prove that in the absolute absence of carbon dioxide iron can remain in contact with water and oxygen without rusting, but that such entire exclusion of carbon dioxide from the gas and liquid needs most minute precautions, and has been probably the fatal flaw in many experiments yielding contrary results. He further shows that iron is remarkably sensitive to the attack of carbon dioxide—a definite weight of this gas in the presence of moist air exerting an even greater corrosive action than an equivalent quantity of hydrochloric or sulphuric acid. Let me quote one of his experiments.

Distilled water which has been shaken with, or left in contact with, air is poured on a perfectly clean, polished surface of iron. At the end of forty seconds, when the water is seen to be clear and the metal perfectly bright, the water is allowed to run into a porcelain basin containing a drop of a dilute solution of potassium ferricyanide. A marked blue coloration immediately results. If a similar experiment be made with rain water instead of distilled water, the iron is found to be even more readily attacked, ferrous salt in solution being detected after thirty seconds' contact. The ferrous salt found in solution in these experiments is obviously formed by the interaction of a very dilute solution of carbonic acid and water, for recently-boiled distilled water does not dissolve the metal.

The colour of rust is somewhat variable, being mostly a rather bright yellowish red when newly formed, and passing, with age and increasing thickness, into dark red-brown, or even blackish-brown. Very old rust is mostly blackish-brown, and exhibits a more or less lustrous, almost crystalline appearance. When powdered, rust is bright yellow-red like the fresh product.

Various analyses of rust have been published, whose differences point to the specimens being of varying age and degrees of alteration subsequent to the original formation. Evidence being lacking of the composition of specimens representative of the material in course of comparatively rapid formation, Dr. Moody collected it from the unpainted interiors of iron flushing tanks in constant use. Every sample gave off carbon dioxide when placed in hydrochloric acid, and the condition of the iron present in each is given in the following table:—

Percentage of iron as ferric oxide . .	55·73	51·12	64·60	65·13	68·89	67·46	
,, ,, ,, ferrous oxide . .	32·86	36·57	25·74	25·66	23·18	24·40	
,, ,, ,, ,, carbonate.	11·40	12·31	9·66	9·21	7·93	8·14	

Clean iron kept in a flask completely filled with a saturated solution of carbon dioxide, gave off hydrogen for weeks; but the solution remained perfectly clear and colourless. On boiling, a green precipitate settled out, which effervesced with acids, turned red on exposure to air, and gave all the reactions of ferrous carbonate, so that the iron in solution must have existed as ferrous bicarbonate. Another part of the solution was readily decomposed by atmospheric oxygen, yielding a mixture of ferrous carbonate and ferrous and ferric hydroxides, part of the carbon dioxide being simultaneously regenerated. The mechanism of rusting hence seems to be the formation of a soluble ferrous salt and liberation of hydrogen as a result of the combined action of water and carbon dioxide on iron, and the subsequent oxidation of this soluble ferrous salt by atmospheric oxygen into ferrous carbonate and hydroxide and ferric hydroxide.

Dr. Moody examined the effect of leaving recently formed rust fully exposed to air. One of his samples was roughly powdered and spread on a porcelain dish. After eight days, when the whole surface had changed to a rich brown colour, it was analyzed again. The percentage of iron as ferrous oxide had been reduced from 32·86 to 14·11 per cent., and the ferrous carbonate from 11·4 to 5·62 per cent.—slightly more than 50 per cent. in each case. This rapid oxidation accounts for the low percentages of ferrous iron in most published analyses of rust.

The persistence of ferrous iron in the rust of iron where rusting is still progressing, is explained by the material being partly surrounded by a reducing atmosphere of hydrogen which is constantly being liberated on the surface of the metal.

It is known that iron and iron-rust can act as a voltaic couple, and that when iron is impure (as all commercial specimens are), or when another metal is present, electrolytic action is liable to take place. Such action may be not without a potent influence in accentuating rusting; but it is easy to attach undue importance to it. In any case, all the precautions and treatments mentioned subsequently apply with equal force whatever the mechanism of rusting may be. Recent investigation is dealing with the probable action of impurities in accelerating the formation of rust; and sulphur appears to be a harmful impurity in this as in other connections. To its presence has been traced the internal corrosion of some boilers where the water was alkaline and ordinary rusting impossible.

Oxidation of Iron Compounds in Nature.

This process of the oxidation of iron compounds is one of the universally occurring chemical changes of the world, important and ubiquitous, even if slow and little thought of. Iron compounds exist in all rocks and soils, in practically all waters, and in all animal and vegetable matters. The oldest rocks of the world are those known as igneous rock, of which granite may be regarded as a typical example; and all these igneous rocks contain iron compounds. How they have got these, we can hardly explain. But, in passing, it may be mentioned that the great disparity between the density of the earth as a whole and the average density of its crust points to enormous masses of matter having a density of at least more than six times that of water, situated in the earth's interior. If not metallic ores these are likely to be masses of metals in a free state, and of this a number of confirmatory indications exist. In the course of the weathering of these igneous rocks, some constituents—*e.g.*, felspar—are chemically attacked by the carbon dioxide charged rain-water, partly dissolved, and thus disintegrated. The remainder of the felspar is washed down and deposited as clay (aluminium silicate), and the quartz as sand. The iron compounds are thus liberated, and some are dissolved. In both processes oxidation proceeds, with the formation of hydrated iron oxide and carbonate—water thus playing an important part as a carrier and disperser of iron. To this iron oxide is chiefly owing the colour of the soil; to it and to other iron compounds most of the colours of clays are due; while the natural earthy pigments—the ochres, siennas, and umbers—are all largely iron compounds. We have seen how iron salts in solution are oxidized and deposited as insoluble ones; and this is going on more or less in most running water, and causes the colouring of the stones in the beds of streams which has made "The Red Beck" so common a name here in the West Riding. To this cause may be attributed the red and brown stains in ordinary sandstones, and the colour of the wholly red sandstones. Indeed, some of these red sandstones are so plainly only a surface coating of iron oxide on sand grains that a few minutes' boiling with strong hydrochloric acid is sufficient to decolorize the sand grains, as in the case of the natural and treated samples of the very loosely coherent Penrith sandstone.

It is worthy of note that most iron ores are either oxide or carbonate of iron; and though the origin and mode of formation of metallic deposits are surrounded with much obscurity and uncertainty, it is most probable that water has had a large share in their assemblage into veins and lodes. So far, therefore, from thinking of the wide diffusion of iron compounds in small quantities as having originated from ore deposits, it is precisely the reverse which is the most probable. We are beginning to realize also that bacteria (whose action—beneficent and otherwise—seems to be universal and contributory to so many chemical changes) are not without their share in precipitating iron oxide from solutions, and deposits in trunk water-mains have in a few cases been traced to them.

Formation of Bog Ore.

The formation of our familiar "natural oxide" or "bog ore" is another instance of iron oxidation. This is essentially peat on which hydrated iron oxide has been deposited. In some lake, pool, or backwater in far distant times, peat moss began to grow and accumulate. From year to year this would spread, and dying at the bottom while it continued to grow upwards, would, in the course of centuries, form a peat bog. If, now, the water passing through this bog happened to be highly impregnated with iron compounds, these would oxidize and deposit in a fine and ultimately porous condition all over the organic remains. If ultimately the amount of deposited oxide is sufficient, this chalybeated peat is eligible for use in gas purification; and the percentage of peat and the consequent porous condition of the oxide is what settles its value for this purpose. It is usually too poor in iron and too valuable for gas-works purposes to be smelted, though the lake ores of Sweden and Lower Canada which are smelted for iron are practically "bog ores."

Iron Pyrites.

While discussing iron deposits, iron pyrites will come to mind with any one interested in coal. While no conclusive evidence of its formation has yet been adduced, or any generally accepted explanation put forward, yet it is obvious that its formation has been subsequent to the original deposition of the vegetable matter that has finally become coal; and therefore water has probably been an important factor.

Iron pyrites in its turn affords interesting instances of the oxidation of iron compounds. The danger of the spontaneous combustion of stacked coal originates with the heat produced by the oxidation of the finely-divided pyrites in the coal. This oxidation tends to break or weather the coal, exposes more pyrites surface to the influence of the air, while the rising temperature begins to set up destructive distillation of the coal itself. So powerful is this oxidation under favourable circumstances that a cargo of pyrites is notoriously one of the most dangerous cargoes a ship can carry—more so even than coal; and many a slab of polished granite that happened to be rich in iron compounds and was exposed to the weather, has undergone such rapid and extensive corrosion as to shake the owner's belief in the imperishability of granite.

Another instance of the oxidation of pyrites is seen in the natural formation of ferrous sulphate crystals—copperas or green vitriol. These large, glassy looking crystals suggested the designation of "vitriolites," from which the name vitriol is derived. While their distillation was the original method of preparing sulphuric acid, and, with suitable modifications, still supplies us with Nordhausen or fuming sulphuric acid.

The oxidation of the two other iron sulphides produced by the action of sulphuretted hydrogen on gas-works oxide, though of supreme importance to us, is so familiar and well understood that any further reference to it here may be excused.

Iron Oxide Paints.

The iron oxide paints so familiar in gas-works usage—to which later reference will be made—are not prepared from the burnt oxide residue from vitriol works (which unfortunately is quite unsuitable), or as a rule from natural oxides. They are mainly produced from the many waste liquids containing iron compounds that modern metallurgical processes afford us, especially in galvanizing and tinning iron goods, and in the wet processes for the recovery of copper from the burnt oxide left behind when Spanish cupreous pyrites are used in the manufacture of vitriol. The iron in these liquids is precipitated by an alkali (generally lime), the oxide collected, dried, and calcined till it reaches the desired depth of colour. Some of these waste liquors are also worked up in the production of artificial oxides for gas purification.

Corrosion of Iron by Acids.

So far we have been mainly concerned with the natural oxidation of iron, and have seen that in such cases the first step is the attacking of iron by an acid—the carbonic acid gas dissolved in water. Other acids in varying degrees act similarly on iron, producing salts, which in their turn oxidize. Even if the amount of such acid is small and its supply not continuous, still when the attack has once been opened, and the surface of the iron gets decomposed and rusted, we have seen how effectually the ordinary atmospheric conditions can follow up the attack. Hence the need for protective covering of iron otherwise exposed to such acids is obvious. Instances that suggest themselves are sulphur dioxide and sulphuric acid in the air and rain-water; various sulphur acids and others in the refuse-made ground where gas-services have often to be laid; carbonic and humic acids in the ground and its water, urine acids in the subsoil of our roads, and sulphuretted hydrogen, acetic, and carbolic acids in any raw tar used in making tar paints.

The sulphur dioxide emitted from fires, which plays a not inconsiderable part in intensifying town fogs, is also a powerful factor in atmospheric corrosion in towns; and Professor Church's discoveries of the amount of calcium sulphate in deposits found on the exterior of St. Paul's Cathedral is an unmistakeable proof of this. As gasholders are often pretty well exposed to the influence of chimney smoke, this consideration adds some force to their claims for watchful guarding. Again, owing to the usual stagnant condition of the air during fogs, its various layers do not get sufficiently quickly intermixed as to equalize its composition, and smoke and chimney gases cannot rise far. At such times, even in fairly open and favoured situations, the amount of atmospheric carbonic acid which ordinarily is practically constant often rises to double—a fact I have found it important to remember when carrying out ventilation investigations. It is

evident again how a gasholder directly exposed to chimney smoke will suffer in any corroded parts under such atmospheric conditions, and the more as condensed moisture to dissolve this excess of acid gases is then also abundant.

Corrosion of Iron by Cyanides.

Iron corrosion plays an important part in the puzzles and worries of a sulphate of ammonia plant. Blue salt is caused by the formation of a small amount of Prussian blue (ferric ferro-cyanide) among the sulphate. So powerful a pigment is it, that in the bluest of blue salts the amount is so small that its estimation is extremely difficult; and yet it causes a drop in the price out of all proportion to the amount of this impurity or any disadvantages attaching to the use of the sulphate as a fertilizer. Various cyanides are inevitably present in the liquor undergoing distillation and in the gases passing through the saturator; when blue salt is produced these have re-acted with iron compounds present in the saturator liquor. So that for our present purpose we may regard as the source of the whole trouble the corrosion of the iron pipes by the sulphuric acid and the sulphuretted hydrogen. Iron must be present in both the ferrous and the ferric condition before blue salt can be produced; and this suggests a somewhat common and interesting case of oxidation. Salts of quite a good colour when first fished sometimes develop the blue on standing. This is due to the formation of ammonium ferrous ferro-cyanide—a white, insoluble salt which settles out among the sulphate crystals. On exposure to the air oxidation takes place, and the familiar blue tinge appears. At some works, so as to place the blame on the right shoulders, a freshly-drawn sample from the saturator is tested, either with an acid solution of a ferric salt or with a few drops of hydrogen peroxide solution, to see if the objectionable white salt had already been formed, lest it should develop the blue only on the salt being subsequently fished out when another man is in charge. This testing with hydrogen peroxide is especially valuable when the salt is bagged immediately after drying in a centrifugal machine.

Corrosion of iron by the various cyanides themselves is forcing itself upon our attention from several directions. In some forms of sulphate of ammonia stills, the ironwork is found to become coated over with a deposit which is largely Prussian blue, under which the iron itself gets thinner and thinner. Those who have any experience of the recovery of cyanides in the form of ammonium sulpho-cyanide by the Chance and Hunt process, know that the action of this liquor is positively phenomenal in its avidity for steel and wrought iron. At present, all steel and wrought iron in the washer-scrubbers used is, as far as possible, cased with cast iron, as this has a longer life, and evidently resists the corrosion better.

I have not had an opportunity of investigating the matter, but the unexpectedly rapid corrosion of the iron base and the bars at the bottom of suction-gas scrubbers seems to suggest cyanide as well as sulphurous action, especially as steel is found to suffer so much more rapidly than cast iron. Where a steel base is now being supplied, it is mainly because it is cheaper than cast iron would be, with its necessary jointing arrangements. Similar rapid corrosion takes place at the exhaust valves of a gas-engine using suction gas, just where the gases in passing through the valve impinge upon the spindle. These were first made of solid steel with a thin head; then, owing to rapid corrosion, a cast-iron head with a steel spindle was introduced; and in the best practice now both the head and the spindle are made of cast iron in one piece. Whatever the exact explanation of this unexpected corrosion of the valves may be, it is interesting to know that it has been coincident with the use of suction gas, and was hardly noticed, if at all, with town gas. Anyhow, these are additions to the growing "*per contra*" side of the balance-sheet of suction gas working.

Paints and Protective Coverings for Iron.

We have now to consider our most important section—viz., how to prevent the corrosion which is inevitable to exposed iron. For gas-works' purposes, the only method is to coat it with some liquid substance capable of drying hard so as to form a solid and fairly durable skin that will prevent access of moisture and air.

Lacquering.

If no special regard is paid to permanence, or if the iron will receive no rough usage or external atmospheric exposure, this object can be attained by simply painting with a lacquer. Lacquers are a kind of spirit varnish made from shellac or some other lac, and sometimes coloured with an aniline dye, &c. The Far East is the source of all our lacs; and a notable use of lacquering was its adoption for protecting the hulls of the Japanese warships prior to the late war. The coating consisted of pure lacquer, with an admixture of mica or kaolin—a perfectly inert material added to give more body to the lacquer and to increase its binding power.

Greasing.

For temporary protection, and especially if the iron is to be stored and not handled, fats and oils afford a good protection. These fall into two great classes, drying and non-drying oils. In the main, the former contain the elements carbon, hydrogen, and oxygen, and in drying absorb oxygen from the air, becoming converted into a resinous and partly acid substance which forms a coherent film. The non-drying oils which are, in the main, hydrocarbons, either evaporate wholly or remain more or less fluid, and do not absorb oxygen. In greasing iron for prolonged storage, fats which absorb oxygen and develop free fatty acids are to be avoided, as these acids themselves attack the iron. Tallow is often used, but is very inadvisable, as it soon becomes converted into a rusty brown mass and allows the iron to rust. Better results are obtained from mixtures of vaseline and paraffin wax dissolved and thinned, if necessary, with petroleum oils or turpentine.

Bottoming.

For "bottoming" ironwork or giving it a first protective coat (often in a contractor's yard, and until erection is sufficiently advanced to warrant formal painting), boiled linseed oil is often used. As to the efficiency of this, strongly divergent views have been held; the objections to it being its well-ascertained meagreness of any lasting protection, and its violation of the rule that to secure adherence and durability of successive coats of paint, one rich in pigment must not be put on top of one with a greater proportion of oil and less pigment. However, providing that the subsequent painting is not long delayed, and that the oil is laid on in a very thin layer as hot as possible, its use seems not only permissible but advantageous.

Oil Paints.

For complete and durable protection, oil paint is the one adequate covering. This consists of boiled linseed oil mixed with some pigment. It dries by combining with a large proportion of atmospheric oxygen, forming a cohesive skin whose solidity and durability depend largely on the purity of the oil and the nature of the pigment. Eventually, however, sundry changes in the paint skin are induced, originating largely in the inevitable chemical change in the acids of the linseed oil and the formation from them of a more brittle substance. The mass then gradually attains a condition in which, though still hard, it can easily be removed by scraping. Further decomposition goes on, the combination between pigment and vehicle is destroyed, and the latter is gradually removed by the action of rain, wind, and the sharp dust blown against it. Whatever the exact changes may be, and whatever the composition of the original paint, this destruction is inevitable; and it is all-important to realize the need of a sufficiently speedy re-painting, and to be alert to detect the signs of this need.

Raw linseed oil dries but slowly. By a preliminary heating to between 400° and 500° Fahr. for a few hours, its oxygen absorbing properties are increased, and still more so by the addition of driers. These are mainly lead or manganese compounds (litharge and red lead being the commonest), and are added in the proportion of ¼ lb. to 1 lb. per cwt. of oil. Their drying action is unmistakable, though the exact chemical explanation is not quite certain.

The Use of Oil Paints on Iron.

Oil cannot penetrate iron as it can wood, so the connection between paint and metal rests solely on adhesion; and the most important part of the painting is the application of the first coat, as the adhesion of all later coats depends on the security of the coats already there. The metallic surface must be clean, dry, and free from grease. Any trace of rust or other adherent matter must be removed with steel scrapers or steel wire brushes. A slightly rough surface assists paint adhesion. The bluish layer generally found on rolled plates is good for a protection against rust; but this must be scraped off before painting, or else it will afterwards shell off, carrying the paint with it. If petroleum oils have been used to assist in the removal of rust, the surface must be entirely cleansed, as the merest film of oil will prevent the paint from sticking, and will give rise to bubbles or retard drying. Turpentine is sometimes used instead of these oils, as, though a hydrocarbon, it is yet a drying oil. Many failures of paint can be traced back to a damp surface. On a wet surface of iron paint absolutely refuses to adhere; but labourers often fail to understand the meaning of absolute dryness. Paint will lie on a damp iron surface, only when dry it flakes off. The painting of external iron should never be begun early on a spring morning or at any time when condensed moisture may be on the iron, nor continued late on a day when the metal is rapidly radiating away its heat and incurring the risk of condensing moisture out of the air. Moisture on wet paint is also to be deprecated. Consequently, a very fluid and quickly-drying paint must be used in a uniform thin layer. All rebates, rivet heads, grooves, &c., where water could lodge and penetrate must be thoroughly painted; while the rivets and their holes should have received, if possible, some treatment before having been inserted—the thinnest coating of hot boiled oil being sufficient if allowed to get thoroughly dry.

For the "bottoming" coat of paint, either with or without previous oiling, red lead or iron oxide is used. The former is often prescribed to be done in the contractor's yard, and in most circumstances is undoubtedly the best. White and red lead alone among the pigments actually enter into chemical combination with the oil, forming with it a quick-drying layer of good adhesive power. They cover remarkably well and, most important of all perhaps, have been definitely proved to be the most rust-resisting of all paints—red lead being rather better than white. In fact, they are the only true rust preventatives. Their blackening with sulphuretted hydrogen is, however, a gas-works contingency that affects the question of their availability.

Red lead paints have not quite the same degree of firmness as good oxide paints, which will stand rough usage when once perfectly dry; and this tough and elastic coat has much to do with

their popularity for outdoor work. Their colours also are less harsh and crude than red lead. Red-lead paint needs a lower percentage of oil than any other. Hence it soon perishes if used as an outside coat. It needs covering with a more durable paint with a higher proportion of oil. An upper coat should always thus contain more oil in proportion to pigment than the lower coat; otherwise it will tend to harden before the lower one and produce cracking. This happens in any case if the lower layer is covered before being perfectly hard (a later stage than mere drying), and then sunshine raises blisters in the under layer.

On the whole, for general ironwork, the treatment that most commends itself consists of:

1. Thorough scraping in the shops or yards and a coat of hot linseed oil.
2. Two coats of red-lead paint.
3. Two coats of an iron-oxide paint.

Among other important instances, this was the plan followed, and with notable success, on the Forth Bridge. There any place subsequently showing signs of rusting is well scaled, scrubbed with wire brushes, coated with boiled oil, a coat of mixed red lead and iron oxide (the latter added to approximate the colour to the rest), and a top layer of the oxide paint.

Importance of Pure Materials.

Much of the durability of paints depends on the purity of oils and pigments; and the inclusion of foreign materials is very prevalent. It is but fair to say that this is not so much deliberate adulteration as a course almost necessitated by the craze for cheapness, though high-sounding names and great claims for exceptional properties are often allied with inferior and inert materials and small preservative value, &c. Linseed oil is often admixed with resin oil; and this causes what would otherwise be a durable layer to become cracked and brittle within a short time of drying. Red and white lead often contain barytes, which impair their value, covering power, and durability. Do not be misled by the assertion that it comes from one of the best houses in the trade, &c. This is the kind of retort I have met when condemning samples. Admixture with inferior ingredients in order to get grades of various prices is universal, and much of it is perfectly open and above board. Painters who buy white lead know perfectly well what the grades mean. [By the bye, the designation Grade No. 1 might possibly catch an unwary outsider (just as the term 90 per cent. benzol might), and make him think it was the highest grade. He will find "Best" a purer article, though it is admixed with barytes. The only pure grade is "Genuine."]

Fine grinding is essential for the production of a good paint; and the perfunctory stirring up of the dry colour with oil in the paint pot, by means of a brush, and in any proportion is only good for daubs. Paint insufficiently ground, or not ground at all (common with red lead "bottoming" paint), is apt to separate out into pigment and vehicle and give a friable uneven surface.

Where several coats of paint are to be given, each has sometimes a different shade to the others, so as the better to show if each covering has been complete.

Whatever else may afford a suitable field for economizing expenditure on gas-works, paints and painting should not be so marked out. Begrudge paint to woodwork if you will, but to make iron painting last as long as it possibly can, and to say when signs of extensive paint decay show themselves that it must get worse before it will be worth while re-painting, is but false economy.

Re-painting and Patching.

The actual life of a paint surface varies, depending on the amount and quality of the paint, the method of painting, and the exposure to which it has been subjected. All paints finally perish, either as the result of cracking or in consequence of progressive oxidation of the oil, which leaves the paint in a friable condition only loosely adherent. The cracks may admit water and engender rust, while the damaged and permeable coat of paint takes up and retains water, and thus aids rust formation at any exposed points. If general deterioration of surface is showing in friability and loss of lustre, a coat of linseed varnish should be at once applied. This is eagerly absorbed by the paint, which again becomes impregnated, and will now be able to resist atmospheric action for an additional period. This is much preferable to waiting till corrosion has become serious and then preparing the surface and re-painting. For such large surfaces as holders varnish is too expensive, and a fresh coat of paint is on the whole more advisable than plain oil.

If cracks have shown themselves, these may reappear after an oil coating; while if the smallest particle of rust has formed, the destruction of the coat of paint proceeds rapidly—rust spreading under the covering and making it shell off.

Testing Paints.

The methods of adequately testing oils are intricate and expensive, and oil-faking is skilful and elusive, so that frequent testing is out of the question. The simpler tests by which resin and fish oils can be detected and unsaponifiable matter estimated should, however, be carried out on all bulk deliveries. Pigments can be much more easily examined. So much, too, depends on the grinding of the paint, the boiling of the oil, &c., that laboratory tests are not wholly adequate. Very few particulars of any large scale testings have been made public, though such large users as railway companies employ this method. In the main, such testing consists of large painted surfaces exposed on fences and closely watched to see how the paint stands. North Dakota has gone far ahead of us, as it has officially instituted such tests, and passed draconic laws obliging manufacturers to state on the tin in which paint is sold the proportions of ingredients other than the recognized pure materials. In the main, our experience must guide us. Dealing with firms of good standing, being willing to pay the price at which alone a good and genuine article can be sold, and remaining faithful to goods of proved excellence, is the wisest and cheapest course in the long run.

Influence of Sulphuretted Hydrogen.

The extent to which lead paints are permissible on a gas-works is partly a question of local conditions. Some engineers rule lead paints out altogether, because of their blackening with sulphuretted hydrogen, and the risk of entire spoiling if the wet surface be suddenly swept by an exceptional amount of the gas. Iron oxide paints alone may be used very well. They afford less protection against rusting, and additional watchfulness is called for. Some insist on no white lead being added to paints. Zinc white can be used; it has nearly as much body and covering power, and is a really good rust-preventative. This is largely used in mixing with other pigments for colours other than black or red, and is highly to be commended. It is non-poisonous; and, though of not quite equal value to white lead in some respects, it is all right on gas-works where utility rather than decorative effect is the chief end of paint. In this same connection, some object to the litharge in boiled oil. Seeing how small is its quantity (½ lb. in 1 cwt. of oil), this is carrying refinement rather far, though oil can easily be prepared with manganese instead of lead driers—a slight extra darkening of the oil making no difference in gas-works paints.

On the whole, it is easy to attach too much importance to the question of escaping sulphuretted hydrogen. If no sulphided lime has to be dealt with, the amount of the gas in the air should not be great, and will come only from a few sources, which should be closely watched.

Tar Paints.

Oil paints are rather expensive for some cases of iron protection, and tar paints are largely employed. For coating service-pipes, a composition which is mainly pitch and tar melted together, or a solution of pitch in petroleum or tar oils, is used. In these cases raw tar will contain traces of liquor and acids, both of which will lead to corrosion, so that adequately treated tar oils are better and not really much dearer. The pipe-ends are plugged, and the previously heated pipes painted with the mixture, or, better still, immersed in the hot preparation for a few minutes and then allowed to drain. An extensively used American preparation consists of raw tar boiled down with slaked lime (to neutralize any acids present). A little tallow and powdered resin are added and incorporated. This mixture is stored when cool, and when wanted for use has a small amount of a thick solution of crude rubber in turpentine added. The hot pipes are then immersed in the hot liquid.

Dr. Angus Smith's composition of tar and pitch is perhaps the best known; and ironfounders generally give their pipes a coating with it.

Steel pipes, being more susceptible of corrosion than cast iron, must not only be thus coated, but wrapped in canvas, jute, or some other suitable material.

Tar has one incidental advantage of great value. Several references have been made to the danger of rivets rusting, and the need of protecting them. The use of oil paint is precluded in hot riveting; but tar can be employed. The momentary charring of the tar does no damage; the residual matter between the plates and round the rivet heads being resinous matter and carbon.

Gasholders are on some works painted with tar paints. Some contain asphalte, and some graphite; while others are composed of pitch dissolved in light petroleum oils, or even tar oils. These have the advantages of being unaffected by sulphuretted hydrogen, acids, and dirt stains. Two dissimilar dangers accompany their use. The paint may never become completely hard, and some of its solid constituents may break away quickly.

This part of my subject I have been able to deal with but meagrely, and I hope that subsequent speakers at the meeting will supply what is lacking.

[For the discussion on the above paper, see p. 451.]

Manchester District Institution of Gas Engineers.—The 156th quarterly meeting of the Institution will be held at Bamford (Derbyshire) next Saturday. The *agenda* includes a paper on the "Slot-Meter System," by Mr. E. A. Harman, of Huddersfield; and a description (which will be taken as read) by the President, Mr. J. W. Morrison, of Sheffield, of the "Derwent Valley Water-Works." After the business meeting, by kind permission of the Chairman of the Derwent Valley Water Board (Alderman T. R. Gainsford, J.P.), the members will be permitted to inspect the extensive reservoirs and dams in the Derwent Valley that are being constructed for supplying Sheffield, Leicester, Derby, and Nottingham with water, for which purpose the Board have granted the use of their private railway. When the party return to Bamford, they will have tea together at the Marquis of Granby Hotel (where the earlier meeting is also to take place).

CONSTRUCTION OF COIN-FREED MECHANISM AS APPLIED TO GAS-METERS.

By Thos. S. F. Gibson, Assoc.M.Inst.C.E.

[A Paper read before the Junior Institution of Engineers, May 12.]

The idea of applying coin-freed mechanism to the gas-meter can, in the author's opinion, be justly assigned to the late Mr. Brownhill, who, in May, 1887, filed a patent (No. 7012), "to provide a gas-meter which, after the insertion of one or more coins, will automatically supply an equivalent quantity of gas." It has been stated that the priority should be given to Mr. Wallace; but though this gentleman patented several coin-freed apparatus, he does not claim their particular application to gas-meters.

Mr. W. E. Price read a paper in November, 1888, in which he described an apparatus he had patented in 1887 (patent No. 15,161). About this time several papers were read by various gas managers, who wished to increase the sale of gas but could not see their way to reach the working class on the old deposit system. The coin-freed gas-meter, therefore, made its appearance at a very opportune time, and, consequently, was largely adopted. As to who was actually the first to take up this method of selling gas, it would be very difficult to say. The late Mr. Frank Livesey (then Chief Engineer of the South Metropolitan Gas Company) ordered several of the original Brownhill meters; and an early patentee, Mr. Marsh, writing to the "Journal of Gas Lighting," in December, 1898, gives the credit to that gentleman, together with Colonel Robinson, of Liverpool.

With a view to showing how popular this method of selling gas became, the author would like to quote the following information from some articles in the "Journal of Gas Lighting," on "Slot Cookers and All About Them," by the late Mr. E. W. T. Richmond, the first of which appeared on Nov. 15, 1898. "The first South Metropolitan public reference," Mr. George Livesey writes me [Mr. Richmond] under date Sept. 20, 1898, "was in the report ending June, 1893; and then at the meeting on Aug. 22. We began in 1892 with a boiling-ring, which never approved itself to me; and in 1893 we discarded it in favour of a stove." In December, 1898, six years from the start, there were 90,000 meters on this Company's district. In the period 1877-1883, there were only about eleven patents applied for, for general coin-freed apparatus. From 1884 to 1888, there were 460 applications. The effect on the coinage of the country of using the system in connection with gas-meters, coming on the top of the growing desire of the public to purchase small articles in this way, was such that for the year ending March, 1897, more than three times the number of bronze coins had to be minted to meet the shortage due to the number locked up in various machines. [It may be added that the 90,000 meters mentioned as being in the district of the South Metropolitan Gas Company would alone have the effect of locking up about 60 tons.]

There is no doubt that the advent of the slot-meter must have had a good effect on the reduction of the fire risk in houses in which, until then, only paraffin lamps or candles had been used. But from the gas manager's point of view, the most satisfactory effect of the introduction of coin-freed meters is the increased sales, as the system has done more to popularize cooking by gas than any appliance other than the stove itself, for the reason that slot-meters obtain an entrance into houses where otherwise there would be no gas at all, and where time for cooking is very limited. The effect of gas cooking is such that the dinner preparation period consumption on a Sunday is now the heaviest of the whole week—night or day.

It is surprising that, in connection with a machine having so many patented and patentable parts as a coin-freed meter, there has been so little litigation; for, with the exception of the threatened action by Mr. Brownhill against Messrs. Sawer and Purves, disputes appear to be conspicuous by their absence. Considerable work and trouble have, however, been given to the police by that fraternity whose business it is not to pay for anything, and to whom this machine seems to be a standing challenge.

The Patent Office naturally has been well (or otherwise) employed in registering the ideas of various inventors. No fewer than 320 patents were taken out previous to 1907; and in 1896 alone, the record year, there were 35. These patents read in sequence suggest the nature of the troubles met with as the use of the apparatus developed. They include, stopping the meter without using a valve on the inlet-pipe, form of valve, stuffing-box for valve, valve-seat, clock mechanism to move valve, provision for leaking valves, checks instead of coins, using the coin on the flat, on edge, as a gag, as a weight, crown-wheel gears, epicyclic gears, worm-gears, electro-magnets for moving valves, money-boxes, sealing and fastening money-boxes, locks, mechanism for various coins, and mechanism to attach to existing gas-meters. In fact, almost every part seems at one time or another to have received attention from inventors. In a good many cases the patent is simply to remedy some defect found from actual use of the meter in every day life—*e.g.*, the patents relating to the valve.

Having somewhat cursorily run over the origin and effects of the applications of the coin-freed mechanism to gas-meters, it may be asked: What are the essentials of the machine itself? It must be a simple, strong, accurate, and compact machine which cannot be easily tampered with. Fraud prevention in the apparatus as applied to gas-meters does not strike the author as such an essential as it would be in any other coin-freed mechanism, because the amount of gas passed is always registered on the index of the meter. Should the coins in the box not be the equivalent of the gas shown by the index, the consumer can be called upon by the gas company to make up the difference, and *vice versâ* the gas company returns any cash over that which the index shows should be in the box. This latter is usually the case when the cash does not tally with the gas used; and it is not an unusual occurrence to find even two-shilling pieces used for pennies, so that consumers make the meter a sort of bank. It will be observed that the coin-freed apparatus on a gas-meter differs from that on a sweetstuff machine in that the actual user of the machine can always be found. The apparatus must be simple and strong, as at times it receives very rough treatment; accurate, so that, although the gas company has the right to ask for the difference in value between the cash-box and index to be made up, they shall not be required to exercise it; compact, because it has to be fitted to the already bulky gas-meter and erected in very small houses.

The design of a slot-meter generally works out somewhat as follows: There is a valve on the inlet to the meter which can be opened by gearing actuated by a handle outside the meter on the insertion of a coin, in such a manner as to form an integral part of the gear. Having opened the valve a definite amount, the mechanism frees itself of the coin. The gas having thus been turned on, it continues to flow through the meter until the valve is shut again, generally by the first motion spindle of the registration gear, which moves the valve gear in a contrary direction to that in which the coin action had moved it.

Many slot-meters have been put on the market in which the flow of gas has to be stopped by holding the meter registration mechanism and relying on the meter valves for tightness. This is not desirable, as it tends to strain the meter as a measuring apparatus. There are several meters in which the coin has not been used as a gag, but simply as a weight on the end of a lever. This movement does not appear to the author as positive enough for the purpose.

In the design of a coin-freed mechanism for a gas-meter, the following details should receive attention: First, there must be some arrangement of fraud prevention to deal with such devices as a coin on a string, a piece of wire inserted through the slot, stopping the mechanism half-way and turning it backwards and forwards; also the slot must be of such a size that coins, which are bent so much that they would not work the gear but only jamb, are rejected. Provision must be made so that when the coin has done its work in moving the gear, it can be discharged only into the money-box.

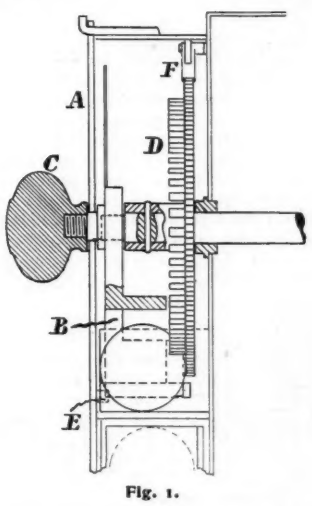


Fig. 1.

Referring to fig. 1, the coin is inserted through a slot in the plate A into the slotted arm B, and so forms a connection between the handle C and wheel D. When the handle has been

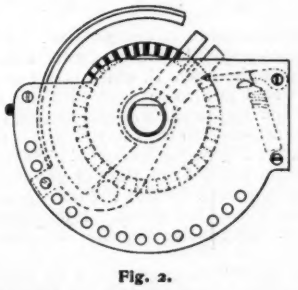


Fig. 2.

turned to its fullest extent, the coin drops free, owing to the arm B coming into contact with a stop E. The arm B carries with it a covering plate; so that until it is returned to its normal position,

no other coin can be inserted. The handle cannot be turned in the reverse direction when the coin is in, owing to the action of a rachet-pawl F acting on the wheel D, nor can it be turned right round, owing to the stop. The plate A is removable, and contains holes round its periphery, so that the angle swept by the arm B is variable, thus giving the necessary adjustment for variation of volume of gas supplied per coin. Fig. 2 illustrates a similar idea, but worked out somewhat differently.

There are two distinct motions to be considered for the actuation of the valve; one, the action of the coin, and the other the action of the meter. These two motions have to be allowed for in such a manner that, though they are contrary to each other, they may go on either separately, together, or alternately.

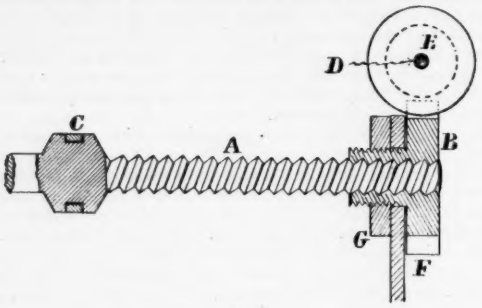


Fig. 3.

Fig. 3 shows a solution by means of a tied nut. The spindle A is rotated by the coin mechanism, and in so doing gets rectilineal motion from the nut B, and carries forward a fork C, which opens the valve. This is returned to its seat by the action of the meter through the spindle D and worm E acting on the worm-wheel F, which is cut on the outside of the nut B. This nut is held by the screwed and pinned collar G from moving laterally; consequently the spindle A is returned to its original position, carrying back the fork C and closing the valve.

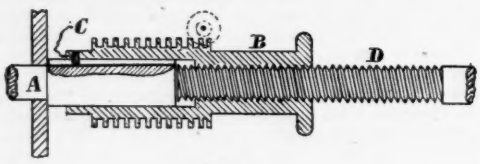


Fig. 4.

In fig. 4, the spindle A is rotated by the coin action, and so rotates and advances the long sleeve nut B, which can slide on the spindle, but cannot rotate owing to the feather and feather-way C. The movement of the sleeve nut opens a valve by means of a lever (not shown in the diagram), and the reverse motion is by the rotation of the spindle D, which is revolved by the meter, but cannot move longitudinally. Consequently, the long sleeve nut B has to slide back upon the spindle A and so closes the valve. The small wheel on the top of the sleeve nut is for actuating a register showing the amount of gas paid for.

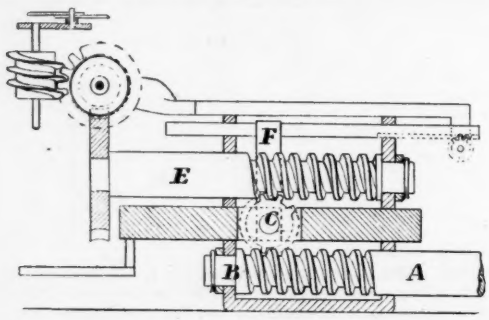


Fig. 5.

Another, and somewhat more complicated, method is shown in fig. 5. A represents a spindle, moved by the coin action, which, when rotated, moves the worm B, which is in gear with the worm-wheel C. This wheel is also in gear with the worm D, which thus becomes a rack and imparts lateral motion to C. C carries a link F, which is attached to the valve, which is thereby opened. As soon as the meter starts, the spindle E revolves and the worm D rotates the worm-wheel C in the reverse direction, and the worm B, working as a rack in this motion, reverses the lateral position of C and closes the valve. It is apparent that both spindles A and E can revolve together or alternately without damage to the gear, and neither can produce motion in the other. When the gas purchased has been nearly all delivered, the gear for shutting-down the valve should do this operation slowly enough to give the consumer reasonable warning that the supply is about to cease, and it is time he again fed the meter. In the case of the gears illustrated in figs. 3 and 4, this is done by the shape of the lever actuated. In both these mechanisms the valve is practically open to its full extent by the inserting of the first coin, and is kept in this position by the lever while the whole of the gas paid for is passing through.

It must be possible for the consumer to insert a definite number of coins not less than twelve; and there should be a register showing clearly how many coins have been passed into the meter but for which the meter has made no return—*i.e.*, how much gas has been paid for but not delivered.

This is very important, not only from the consumer's point of view, of knowing just where he stands, but also from the fact that it is not desirable to work a slot-meter always on the first coin, as it is seldom that the meter passes the same amount of gas for the first coin as it does per coin for (say) six coins put in all at once, the reason being that the backlash of the gear and the compression of the valve face (the valve faces are generally made of soft material so as to ensure tightness) have to be taken up before the motion starts, and this must be always done by the first coin. Should a consumer always work on the first coin, it will be found that the amount of cash in the box is above the value of the gas shown by the index of the meter; and though consumers are always very pleased to have a return from the meter, it is not desirable to be knowingly inaccurate.

The arrangement for changing the volume of gas delivered for the coin must be of such simple construction that it can be easily reached and operated when the meter is in position, and on no account should it be necessary to break the connections to do so. One simple arrangement has been referred to in fig. 1; another, and very popular method, is to change the gear-wheels themselves. It is advisable to always seal the arrangements, so that no one can alter the volume except the specially appointed officers of the company.

The mechanism should preferably be attached to the side rather than the top of the meter, as the largest dimension of the gas-meter proper is its vertical one, and it is generally easier to find positions when there is room laterally and where the head-room cannot be got. There can be no rule laid down here, as the positions in which these meters are fixed vary a great deal.

The whole apparatus must work smoothly and without any tendency to bind or slip, as although the meter is powerful enough without much loss of pressure between the inlet and outlet to move a most refactory mechanism, still there is always a danger of jumping lights. The gear for closing the valve when the gas paid for has been delivered, generally the reverse of the coin-freed gear, must be so attached to the registration gear of the meter that it will not interfere with it in the event of the valve not being tight when home, and so allowing gas to pass and drive the meter. It is desirable that a weak place should be left in the coin-freed mechanism, so that in the case of a breakdown the registration shall continue uninterruptedly. It must be remembered that a gas-meter (dry) is nothing more than a double-acting two-cylinder engine having, in the three-light size, pistons of a diameter of about 8 inches, and, consequently, even at low pressure at which gas is distributed (2 or 3 inches of water), a very powerful machine, and that should the gear jamb when the power is being supplied something has to break, and it is most important that it shall not be anything in the meter itself as a measuring machine.

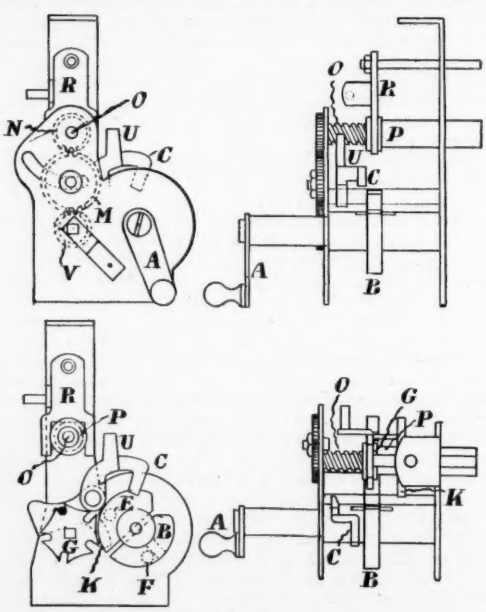


Fig. 6.

From inquiries, the author finds that nearly all the mechanical troubles of slot-meters are due to leaky valves. Many inventors have recognized this, and have brought out ingenious devices, by means of which they hope to make the valves always absolutely tight.

Fig. 6 illustrates a complete compact mechanism which is attached to the side of the meter. The handle A turns the coin-carrier B, which receives the coin through a slot. The coin-carrier has a limited stroke between two stops E and F, and works in the scollops of a scolloped wheel G, so that the wheel G cannot turn except when the coin-carrier is at a predetermined position of its stroke. When the coin-carrier receives the coin, the first movement causes the coin to lift a pawl C; and, immediately the coin passes, the pawl drops and the carrier cannot return to the slot position. The pawl also serves the purpose of making it impossible to introduce more coins than the meter is designed to take; for when the total number of coins are in the meter, an arm U comes in contact with the portion of the nut P (to be described later), so that the pawl cannot lift, and, therefore, the coin-carrier cannot revolve.

When the coin-carrier has passed this pawl, the edge of the coin lifts another pawl K, the object of which is to prevent the wheel G from being revolved when the coin-carrier is in such a position that it could otherwise be made to do so (say) with a wire inserted through the slot or such means. Having lifted this second pawl, the arm of which is long enough to ensure its being held up during the rest of the stroke, the coin engages in a slot in the scolloped wheel G; and as at this time the high points of the scollops in G are opposite a depression in the coin-carrier wheel, it can revolve by the further movement of the handle until just before the coin-carrier comes in contact with the stop F the coin frees itself and drops into the money-box. The weight of the handle then brings the coin-carrier back under the slot to receive another coin.

The wheel G is mounted on a spindle having a square end which carries a pinion V. This pinion is used as a change-wheel, and is held on the spindle by a pivoted Z piece, and gears with a spur-wheel M, the axis of which it is possible to slide backwards and forwards in a curved slot about the centre of the wheel N into which it gears, so as to allow larger or smaller pinions to be fitted on the square end of the spindle carrying the wheel G, and yet keep the gearing in proper mesh. The wheel N is mounted on the end of the spindle O, which is chased with a multiple square thread so as to give the nut P a convenient travel. This nut carries with it a fork R, which has two arms, one of which opens the valve through a lever, and the other moves a register of the coins, showing the number for which gas has not been supplied. The nut P also has a long sleeve which enters the meter; and this sleeve is slotted throughout its length, so that a spindle driven through gear by the meter can be coupled to it by means of a small pin. The meter motion is so designed that, in revolving the nut by means of the sleeve, it travels along the spindle O to its original position, and so closes the valve.

Owing to the number of robberies from slot-meters lately, the money-boxes have received a great deal of attention. In the author's opinion, though it is very important to have a strong box on the meter, its limit of strength must depend almost entirely on the cost considered allowable for this item; and it is not at all desirable to have a first-class safe fixed up against a tin gas-meter. In fact, the cost must be regarded as an insurance premium against robbery, and should be worked out on this basis. Another way to consider the matter is to make the box just strong enough to give the would-be thief sufficient trouble to make him come to the conclusion that it is not worth his while working hard to steal a problematic amount. It is important the mechanism be so attached to the meter that the authorities for stamping are able to stamp, &c., the meter as a measuring instrument, and yet to leave the coin-freed mechanism so that it can be afterwards opened and adjusted, and even small repairs made by the company, without breaking the official seal.

The author has, as far as possible, refrained from describing any particular meter, as it is most difficult to select one; and he feels that members of the Institution will be able to judge for themselves how far the models which, by the courtesy of Mr. Charles Carpenter, the Chairman of the South Metropolitan Gas Company, he is able to exhibit to them, comply with the conditions laid down in the present paper as to the essentials of a good application of coin-freed mechanism to gas-meters.

Points from the Discussion.

The numerous models of the meter on exhibition were of great interest to the members, as well as the large test holder which Mr. Gibson had on view. On the invitation of the Chairman (Mr. Frank R. Durham), the author of the paper demonstrated the action of the different mechanisms. There was a brief discussion, in which Mr. Walter Fendick, Gas Engineer, of Hemel Hempstead, Mr. Cecil Evans (South Metropolitan Gas Company), Mr. W. Ballantyne, Mr. N. Trustrum, Mr. C. H. Smith, Mr. J. W. Hunter, Mr. A. W. Marshall, Mr. S. V. Cooke, and Mr. J. W. Nisbet, took part. Generally the discussion was more of an interrogative nature (except Mr. Fendick's contribution), with a view of eliciting information well known to those engaged in the practical operations of a gas-works.

Mr. Fendick's experience with slot meters had extended over a considerable time; and he related a few of the weaknesses of the early forms of mechanisms, particularly condemning the use of springs, as was originally the case. These used to soon wear out and break; and the gear jammed, and caused a great deal of trouble. Another fault was the complicated gearing, in which several wheels were employed; and with these he had known cases where two, three, or four coins had to be introduced into the meter before gas would pass. This was a very serious fault as a consumer might have a penny, but not several, in the house. He also spoke of the defects of the early form of plunger. The slot meter, he said, must be something simple in construction, easy to understand, and accurate. If it was not accurate, it was very difficult to get the money that was short of the meter registration; although the consumers were quite ready to take back the surplus money in the meter-box. With regard to the valves of the meter, it was necessary to make sure that the pressure of the gas was on the top of the valves. The pressure the valves worked at was very small; and so it would be seen that the valve must be an efficient one. If the gas was cut off from the under side of the valve, a little piece of dust would be sufficient to allow the gas to bye-pass. He pointed out other constructions, whereby leakage might occur at the valves. He had seen it recommended that consumers should know how much money was put into the box. He was opposed to this, and thought it much better to show a consumer how much gas he had to his credit, so that he could tell when to put in a fresh coin. As to the use of strong money-boxes, he preferred the frequent collection. With regard to modern slot meters, he had tried several mechanisms; and they worked with wonderful accuracy—in fact, more than half his consumers were on the slot system, and few troubles were experienced. This was a case in which the ingenuity of man had discovered a most useful instrument, and one that filled a long-felt want. Mr. Cecil Evans asked whether a multi-coin meter was in use. Mr. C. H. Smith, of the Marylebone Electricity Department, remarked that they found electrical coin meters very useful, especially for the use of people residing in flats, many of whom were inclined to move somewhat frequently. A great advantage was that the slot meter did away with the necessity of asking for a deposit. The chief difficulty with electrical slot meters had been that sometimes when a shilling would not go in easily, some people were inclined to accelerate its entrance by the application of a hammer. This had been a real source of failure with electrical slot meters. Sometimes, too, the mechanism stuck, and then the consumer obtained his electricity for nothing, until the collector found that something was amiss by the registration dial. They had 200 to 300 slot electrical meters in use in Marylebone, and there was comparatively little trouble with them. No rent was charged for slot meters, although they cost a great deal more. The consumer, however, had to sign an agreement in which he made himself responsible for payment of the consumption as shown on the registration dial. He thought the signing of the agreement was important, because the consumer was likely to take more care of his meter if he knew he was responsible for the consumption, as shown by the dial. Referring to the large amount of money locked up in slot-meter money-boxes, Mr. Marshall thought the use of checks would keep the money-boxes free from burglary, though the employment of such checks would cut at the root of the system. Mr. S. V. Cooke asked whether the quantity of gas obtainable varied with the pressure in the various parts of the district. As to the slide-valves, were they affected by deposits from the gas, and was any lubricant necessary?

In reply, the author stated that he agreed with Mr. Fendick's remarks as to doing away with backlash in the gear. Frequent collections were no doubt desirable; and the frequency should be settled by the requirements of the particular district in which the meters were fixed. Answering Mr. Evans, he said that there were several multi-coin meters on the market; but he did not consider them desirable, owing to the extra complication making them more liable to become inaccurate. He was not surprised to hear from Mr. Smith that the experience of electrical engineers as to slot mechanisms was similar to that of gas engineers, in finding that the system was a useful adjunct for the sale of their product, although they did not seem, from the figures given, to have found so large a field for it. In answer to Mr. Cooke, the pressure would not affect the registration of the meter, as the difference between inlet and outlet was only that caused by the friction of the meter, and was practically negligible; and the density of the gas would be little affected owing to the possible difference being so small a percentage of the total absolute pressure. The material of which the valves were made, and the light pressure at which they work, rendered lubrication unnecessary; and there was little trouble from deposit in the meter.

A special vote of thanks was passed to the South Metropolitan Gas Company for the splendid collection of models and meters they had sent for elucidating the subject.

Midland Association of Gas Managers.—The spring meeting of the Association will be held on Thursday of this week at Longton, on the invitation of the Corporation Gas and Electricity Committee, whose Engineer (Mr. W. Langford) is President. After being welcomed by the Mayor and the Chairman and members of the Gas and Electricity Committee at the Town Hall, the members will inspect the gas and electricity works. In the afternoon a special train will be provided by the Committee to convey the members to the Apedale coal and iron works of the Midland Coal and Iron Company, to inspect the modern recovery plant. Subsequently the members will have dinner in the Longton Town Hall, on the invitation of the Mayor (Alderman A. Edwards, J.P.); and at the conclusion of this, a presentation will be made to Mr. C. Meiklejohn, in recognition of his long and faithful services as Hon. Secretary to the Association.

WEST'S COMBINED DISCHARGING AND CHARGING MACHINE FOR GAS-RETORTS.

Among the specifications issued by the Patent Office last week was one descriptive of an invention by Mr. John West, of Manchester, for discharging the coke from gas-retorts by pushing it through the retort by a ram, to which is connected an apparatus for conveying the coal into the retort at the same time that the coke is being discharged; the coal being deposited and left in the retort when the ram and charging apparatus are withdrawn.

The patentee refers to patent No. 7288 of 1904 (granted to him) for a discharging machine for gas-retorts employing a telescopic ram which enters the retort and pushes the coke forward until it is discharged. But the apparatus there described was solely for the purpose of discharging the coke. In the present invention, he incorporates with the ram a means for conveying the coal into the retort and depositing it therein—for this purpose providing two or more scoops or troughs of a cross section adapted to suit the profile of the retort, the number of scoops or troughs employed depending on the length of the retort and the available space for the machine in the retort-house.

The scoops are made to telescope into each other; the outer or first scoop being attached to the end of the telescopic ram of the discharging machine. By this means, when the telescopic ram enters the retort, it carries with it the scoop to which it is attached. Each scoop is provided with stops, which engage with stops on its adjacent scoop, and thus carry it forward. In this way, the whole of the scoops in turn are carried forward into the retort; coal being fed into them by a mechanical feeding arrangement before they enter the retort. At one end of the scoop which last enters the retort, a stop-plate is inserted; and this scoop, with its stop-plate, is arranged to remain stationary while the other scoops in turn are being withdrawn from the retort and telescoped into each other—the object of the stop-plate being to prevent the coal returning with the scoops.

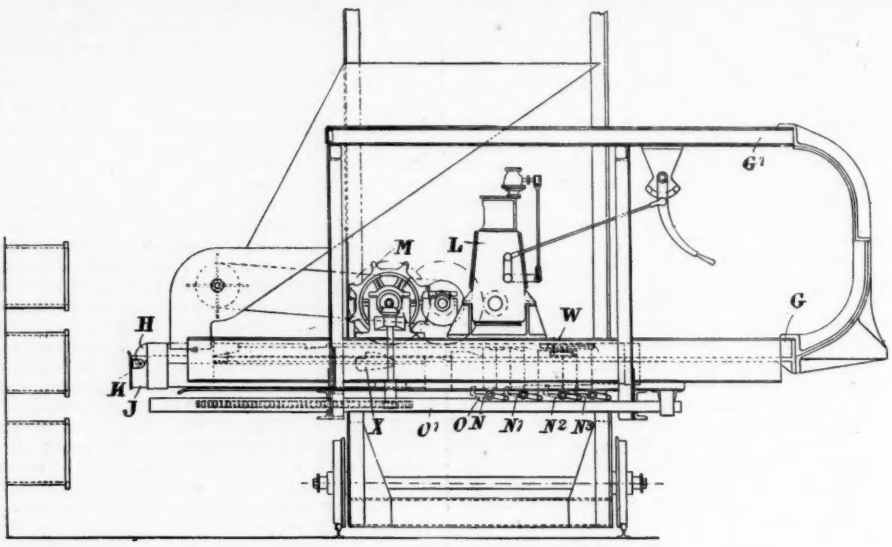


Fig. 1.

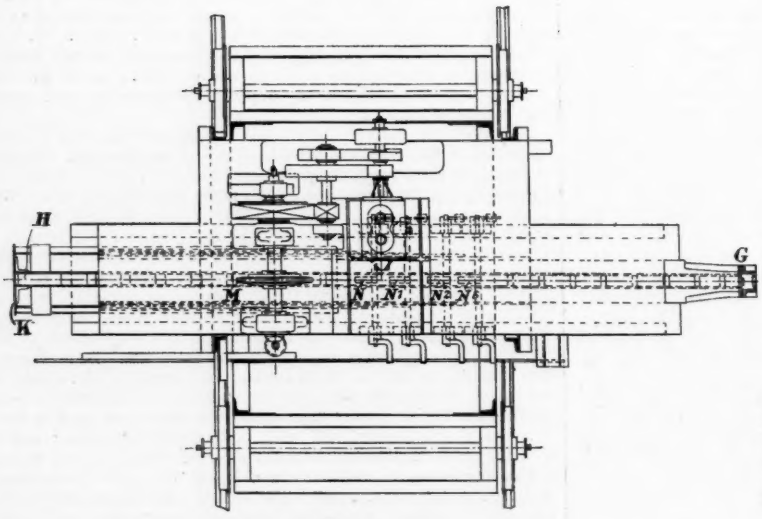


Fig. 2.

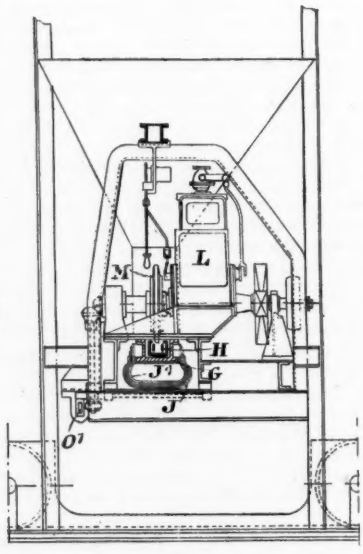


Fig. 3.

The ram-head, which is attached to the foremost scoop, is so hinged as to lift and allow the coal to leave the scoop or scoops when the latter are being withdrawn from the retort. Thus the coal which was carried into the retort by the scoops is pushed out on to the floor of the retort as the scoops are withdrawn from it and telescoped into each other. When all the coal is deposited on the floor of the retort, the whole of the scoops (together with that to which the stop-plate is attached) are withdrawn clear of the retort into the framework of the machine; and the machine is travelled along to the next retort to be operated upon.

The scoops, in suitable sections, telescope into each other as described; and it is arranged that, in extending for discharging the coke and carrying the coal into the retort and in closing up for depositing the coal on the floor of the retort, each of the sections is caused to perform the operations in succession. To ensure this happening, stops and pawl-catches are provided; the latter being arranged, by rack and gearing, to release the scoops in turn when the coke is being discharged and the coal carried into the retort. By an arrangement of pawls the scoops are also prevented from telescoping up out of their turn; the returning scoop, when nearly home, releasing a pawl and allowing the next scoop to return. This operation is continued until the whole of the coal is deposited on to the floor of the retort and the scoops are housed in the machine framework—the last section, to which the stop-plate is fixed, being the last to return.

The machine is mounted on framework provided with travelling and hoisting gear for adjusting the machine to the retorts to be operated upon; and a coal-supply hopper, with feeder gear for regulating the supply of coal to the charging apparatus, is also provided.

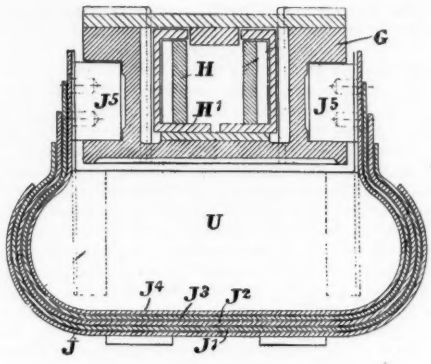


Fig. 4.

The illustrations show a side elevation of the machine, an elevation of the machine looking towards the retort-stack, a plan, and a cross section of the scoops and the discharging ram and casing.

G and G¹ show the discharger casing described in patent No. 7288 of 1904 [see "JOURNAL," Vol. LXXXVII., p. 889]; the end of the telescopic ram H being attached to the scoop J, which carries the hinged ram-head K. The discharging and charging apparatus operates by a reversing motor L controlled by a hand lever; the power being transmitted to the driving sprocket-wheel M by gearing. The scoop J is free to move forward or backward with the telescopic rams; but the scoops J¹, J², &c., are held in position in the hanging frame by means of pawl-catches N, N¹, &c. These catches are, in turn, released by the inclined path O on the rack-bar O¹ engaging with cranked lifting levers attached to the pawl-catches, thus releasing the catches from the scoops and allowing them to travel forward into the retorts in the proper order.

The rack-bar O¹ is operated from the driving sprocket-wheel shaft by bevel-and-spur gear-wheels and vertical shafts; and the ratio of the gear is so arranged that one section or scoop has made its full stroke before the adjacent scoop is released. The spindles carrying the pawl-catches N, N¹, &c., and the crank levers are weighted, in order that the scoops may again engage with the catch pawls on their return stroke into the hanging frame of the machine.

The scoops are provided with inclined paths or lifting wedges, which, when the scoops make their return stroke towards the framework of the machine, lift the hinged pawls in succession, and thus the scoops are, in turn, released and allowed to telescope into each other.

The last section J⁴, which is provided with a stop or push-plate U for pushing the coal out of the scoops on their return stroke, is provided with lifting catches or pawls W and W¹, which, on their outward stroke into the retort, drop into the catches X and X¹, carried on a fixed portion of the hanging frame; and the scoop J⁴ is then held fast on the return stroke of the scoops until all the scoops are telescoped into each other and the whole of the coal is deposited on the floor of the retort. The lifting catches or pawls are then released by means of inclined paths or wedge-pieces fixed on the scoop J³, and the scoops then return into the framework of the machine.

The action of discharging and charging a retort is as follows: The rams are driven into the retort to be operated upon by means of the sprocket-wheel M through the motor and gearing L, and carry with it the scoop J, to which the hinged ram-head K is attached. Coal is fed into the scoops as they travel towards the retort from the coal-hopper above by means of a feeder drum driven by a chain or belt from a shaft of the driving gear. The scoops J¹, J², and J³ are in turn released from the catch pawls N, N¹, &c., as described, until the scoops are fully extended in the retort, when the whole of the coke is discharged. The direction of rotation of the sprocket-wheel M is then reversed, and the scoop J is brought back towards the machine by the discharging ram, and telescoped on to the scoop J¹, when the inclined path or wedge-piece on the scoop J releases the lifting pawl on the scoop J³, and the scoops J and J¹ continue their return stroke towards the machine. The coal during this time is being forced out and distributed on to the floor of the retort by means of the stop-plate U on the section J⁴, and the ram-head K hinges upwards and rides over the coal which is deposited into the retort by the receding scoops returning to the machine. The coal is at the same time prevented from returning with them by the stop-plate U. When the whole of the coal is distributed on the floor of the retort, the lifting pawls W and W¹ on the last section J⁴ are released from the fixed stops on the hanging frame, and the scoops are brought back into the framework of the machine.

Co-Partnership and Profit-Sharing.—An address on this subject will be delivered by Mr. L. W. S. Rostron, at Caxton Hall, Westminster, to-morrow evening, under the auspices of the National Union of Conservative Associations and the London Municipal Society. The lecture, it has been arranged, will be followed by a discussion.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Discussion on Mr. Cranfield's Paper.

The closing meeting of the present session of the above Association was held on Saturday, at the Mechanics' Institute, Bradford—the PRESIDENT (Mr. H. Butterfield) occupying the chair. It was announced that the anonymous contribution, on "Gas Pressure," promised for the meeting had, by request, been postponed till next session, so as to leave the whole time of the meeting available for Mr. Cranfield's paper, which appears on p. 443.

The PRESIDENT, in opening the discussion, referred to the vital importance of a gas manager preventing the spread, and, as far as possible, the commencement, of rusting. Personally, he believed in frequent painting, done promptly when the need was perceived, and done thoroughly, especially as regards the actual laying on and working in of the paint. A most noticeable feature about rusting was that, when once begun, it was difficult of arrest. He believed Mr. Charles Wood, of Bradford, had even tried a sand-blast on rusted places without being able permanently to stay the corrosion there.

Mr. EDWARDS, who was unable to be present, had sent a communication, which was then read. He thought that occasionally the painting of holders was directed mainly by the cost at the time and its relation to the current financial situation. He considered this should be done regularly every second year, at least in the West Riding towns. To his mind, the question of preserving ironwork from corrosion resolved itself into the following commonsense conditions: Sound workmanship in cleaning the surfaces and brushing the paint in; good quality of materials—particularly the boiled oil; pigments of a basic nature if possible; and sufficient time allowed for the paint film to set or harden in air. He did not agree with using solely iron oxide paints. If paint films were absolutely non-porous, the matter would be extremely simple; but they were not. Sulphur dioxide, carbon dioxide, oxygen, and water would ultimately find their way through and work their will on the surface of the metal. If they could be stopped on the way, the surface would be protected much longer; hence the necessity for a basic pigment—*e.g.*, white lead or zinc white. The usual oxide of iron had no such chemical action whatever, nor had many other materials vended under sundry protected names. White lead or zinc white also formed a much better film surface, because, to some extent, it entered into combination with the products of oxidation of the linseed oil, forming a kind of soap, which must have a tendency to hold the mass together and possibly form a colloidal membrane in addition to the true paint film itself. Neither oxide of iron nor graphite paints had any such action. It was important to use only the pure boiled oil when mixing up paints. When extracting the oils from samples, some weird and wonderful decoctions were often found in what was submitted as "boiled oil" at more or less ridiculous prices. He examined all consignments, determining the "constants"—*e.g.*, specific gravity, acidity, saponification value, iodine value, and, if found to be necessary, the unsaponifiable matter. Frequently, in order to get "in," a dealer will submit a cheap oil as "pure," which contains 15 per cent. of unsaponifiable matter, partly resin, nicely blended to the correct specific gravity; and he had known it as high as 25 per cent. This, of course, told against the film setting to a satisfactory and hard surface. New metal goods should always be examined and painted as soon as possible after their delivery by the makers. There were paints in use for protecting the metal during delivery, which mainly consisted of blown semi-drying oils and resins. These dried to a protecting skin when applied, but it would crack off after three months or so.

Mr. T. HAINSWORTH, Teacher of the Painters' and Decorators' Classes at the Halifax and Huddersfield Technical Colleges, being invited to join in the discussion, said that he should confine his remarks to the practical side of the question, and mainly to his own experiences. The basis of the problem was simply the putting of a protecting film between the iron and the air; but when the choice of the material for this film, and the method of forming it, was reached, they found themselves on debatable ground. Some engineers objected to lead paints; but painters had found them eminently satisfactory in their general work, and more especially red lead for covering iron. Acid gases and other corrosive chemicals on gas-works might complicate the issue; but even in very trying situations, a lead paint topped with a zinc one would be very hard to better. He would remind them how important a factor in the case was the expansion of the iron. The paint must dry on the iron; but what was wanted was a coat not too brittle and unresisting—one that would accommodate itself somewhat to the expansion and contraction of the metal. If they painted a piece of elastic, allowed it to dry, and then stretched it, they had an exaggerated illustration of what might happen with an unsuitable layer of paint on iron. Red lead (so much used as a bottoming coat) dried the hardest; hence he strongly advocated the use of raw and not boiled linseed oil with it. With boiled oil it would set too readily and too hard, and even with raw oil it set so readily that it was sent out dry by the dealers and not ready ground with oil as other pigments were. With raw oil, the red lead was easier to put on, and the addition of a little white lead still more facilitated its proper application and improved its final condition. Red lead as a bottoming coat had the further

great advantage that, setting so readily, painters were under no temptation to use "patent driers" with it; and as these were usually of very doubtful qualities—often containing much lime and water (the latter because ground in "oil foots")—they were likely to be inimical in a first coat on iron. The question of fine grinding was intimately concerned with that of the durability of a painted surface. If the particles were large, or even when small, if not thoroughly ground until every particle was impregnated with the oil, the life of the paint would be short. In an important series of tests carried out for the Philadelphia and Reading Railway, three paints of very similar composition varied so strikingly in their durability that microscopic examination was instituted, and the least successful was found to consist of comparatively large particles, separated, therefore, by proportionally larger stretches of oil. He concurred in the need of a perfectly dry surface of iron if the paint was to be expected to remain adhering to it. He once saw a lot of iron railings being painted on a bright October morning. As the night had been frosty, he warned the men that they were making a mistake in painting when they were. Next spring all had to be repainted, and the old paint could be taken off in slips nearly as long as the railings. There had been no visible moisture on the iron; but a film of frost had been there and spoiled the job. He, too, had found cement covering effective; and special cement paints for iron had been patented in America. Resin oil added to linseed oil would speedily yield a hard surface; but it would remain softer underneath, and this would result in wrinkling and fracture of the top surface. In a case he knew of, resin oil in a mixture of red and white leads for jointing hot-water pipes, led to disastrous results, both for the building and the paint dealer. The references in the paper to the need of a rapidly-drying paint were vague. Too rapid drying made a brittle paint surface. Red lead (without driers) would dry in eight hours in the summer and in twenty-four hours in the spring. The latter was a reasonable time in which a paint should dry naturally; and it enabled the next coat to be applied some time on the following day. He had dealt with thousands of blisters in paint. On wood he invariably found water or resin (the latter from knots), and on iron water, or more often rust. A blister was an excessive expansion of a part of the paint surface—originating in nearly every case, he believed, from the presence of water under the paint. The expansion by heat of an excess of oil still liquid under a hardened surface might conceivably cause blisters, but more usually wrinkling. In preparing an old painted iron surface for repainting, all blisters and wrinkles must be scraped off.

Mr. E. J. Sutcliffe would have liked to have heard some explanation of the powerful corrosive action on iron of ammoniacal solutions. He had used zinc white in a place where the paint was exposed to the vapours from gas liquor, and to his surprise the paint gradually went brown. He believed that the electrolysis theory of rusting was gaining favour, and, personally, thought it had to do with the greater liability to corrosion of steel compared with wrought iron and of that with cast iron. He believed that many failures of paint were mainly due to the workmen employed. They were often casual labourers, or those employed during the winter as stokers; and the work suffered from their incomplete understanding of its conditions and their forgetfulness of instructions. He had found them running for shelter from a shower and leaving the paint pots in the rain, and getting water into the paint, also from letting their brushes dip into the water in holder cups and purifier lutes; while the final stage often was to stand the brushes in water at the end of the painting season so that they might be soft for the following year. At Bradford, they never painted after a fall of rain or if rain was threatening. When any rusting occurred, their plan was to scrape all blisters and rust away with steel scrapers, and then use steel wire brushes; polish with these till all rust, &c., has gone and the metal is bright; coat with red lead; paint with a graphite paint; and, finally, paint with a tar varnish, which they got locally, and which was free from water and ammonia. This gave them a good surface, and it answered satisfactorily.

Mr. T. Hainsworth, answering the query as to the discolouring of zinc white, said that it should not be the fault of the pigment, as that could not discolour if pure, and it would not be at all likely to contain white lead. It might arise from some action on the oil, or its driers, especially as while white lead only required 7½ per cent. of oil in grinding, zinc white needed 22 per cent.

Mr. J. H. Hill had been amused with the naming of the grades of white lead. He had found that some "genuine" white lead had not been good enough for them, and had wondered if there were a "Genuine-genuine" grade, like the "Best-best" in iron. For long they had had difficulty in getting a zinc white to stand; but now they had one that answered splendidly about the works when used as a wood paint. On the interior of lanterns it did not answer so well—after a while discolouring, getting crumbly, and coming off when the lanterns were cleaned. Their oldest holder at York dated to 1837; and he believed it had never been entirely scraped since. Latterly, in scraping down to the metal in various places, they had found the original red-lead bottoming coat in thoroughly good condition. They had always used tar on their holders; and it had answered well. With regard to the American preparation for coating service-pipes, they had long used a very similar one; and his Works Manager had confidently claimed it as a York speciality and secret.

Mr. M'Nab inquired about the coating used to prevent corrosion in meters.

Mr. Tetley, a visitor having special acquaintance with paints, agreed in the condemnation given to resin oil and dissolved resin. If much were present, the brittle broken surface could all be rubbed off in a few weeks. Cheap varnishes were often made containing them. They might do for inside work not exposed to friction, but were unsuitable for anything else. Barytes was not wholly a bad thing in paint. It was inert to oil, and insoluble, and did no active harm. He should like to know if the carbon dioxide in the calcium carbonate, which was always present in oxide paints, could, after liberation by such acid gases as sulphur dioxide, in its turn rust iron as the atmospheric carbon dioxide did. There was some action in them that he had not yet bottomed, for he noticed how frequently such paints began to show white. He thought the reference in the paper to quick-drying paint was rather misleading, as the quicker the drying the poorer the paint and the shorter its life, whether terebene or patent driers had been used to secure the rapid drying. As regards the interiors of new meters, egg-shell varnish, or a varnish paint, had probably been used for the sake of speedy work. In a gas-works' meter-shop, a good paint followed by a good varnish was best.

Mr. W. N. Booth said they were rather at a disadvantage in not having had the paper circulated for previous reading. He thought it at least a debatable point whether pyrites oxidation was the main cause of spontaneous combustion in coal, or even if it was of prime importance. Speaking from memory, he thought it was the New South Wales Government who, some years ago, instituted an inquiry into the matter, in the course of which other important causes of this combustion were laid bare. He should have liked to have heard more importance attached to electrolytic action in rusting. Agreeing with the statement that concrete was a good protection for iron, he had found a 2-inch layer of it to afford the only efficient protection of iron when alternately exposed to ammoniacal liquor and the vapours arising from it. As moisture, oxygen, and carbon dioxide were the essentials for rusting iron, it gave rise to the wonder how the interior of gas-holders would be affected now that one can generally rely on finding all three in the gas. Some holders had been found, after years of use, to be devoid of paint inside and evenly rusted over. He would have liked the paper to have dealt with the question of protecting pipes by galvanizing. Iron service-pipes were often galvanized, and steel ones were not. He should be glad to hear members' experiences. Reference had been made to the coating of iron with hot oil in the contractor's yard. The great question was how it was to be applied. Hot oil applied to cold iron was not going to accomplish much good. What was wanted was to place the metal in heated oil, and to let it stay there till its heat was constant. This would be effective; but perfunctory painting would give a coat easily chipped off. Anyone who had dealt with holders containing carburetted water gas, &c., from which oil settled out on to the tank water and finally got into the cups, would be able to substantiate the assertion that all trace of oil must be removed if paint was to be expected to adhere to the iron.

Mr. F. Scholefield said that they had been very conservative at his works, and for many years had remained faithful to one make of oxide paint. On one occasion they had gone in for a cheaper article, only to find the paint surface soon after so badly decayed that they could rub the stuff off, and the powder looked like brick dust. Their holders were cleaned and painted every second year. As a rule, their only difficulty was at the lutes; and last year, when alterations were in progress, the dips were thoroughly scraped, treated with good oil, painted with red lead, and then with iron oxide. Some of the painting then carried out in broken weather had evidently been done on a wet surface; and the paint from whole sheets could be removed in one piece. With reference to Mr. Booth's remark about rusted interiors, he might say that after 35 years' use their two holders were particularly good inside and practically free from any sign of rust; while the colour of the original blue paint was plainly visible on the inlet and outlet pipes. As to the method of oiling the sheets of the new lifts inserted, these were steeped in hot oil, as Mr. Booth suggested, and allowed to dry under cover.

Mr. E. J. Sutcliffe spoke of opening out a large holder after 25 years' constant use and finding very little corrosion in its interior.

Mr. Roper said that their experience of galvanized services at Bradford was that they afforded no effective protection; and it was a long time since any new ones had been put in.

Mr. Butterfield mentioned that on his way to the meeting he had been looking over an engineering periodical, and had come across a paint recommended especially for putting on galvanized iron, which did not look very reassuring as to the benefit of so treating service-pipes.

Mr. Cranfield, in replying, said his purpose in writing the paper had been partly to supply the younger members with a summary of a good many points that they might not otherwise have very accessible. But chiefly he had aimed at awakening their interest on a variety of topics, so as to lead to offers of papers dealing with some of them in ampler detail and with fuller knowledge. He especially thanked their two visitors. He would not detain the meeting with any lengthy remarks, and in the main must let the written paper stand as it was and answer for itself. His chief answer to those who pointed out inadequate treatment of certain parts (which he admitted) was that the paper was already almost unduly long. In reply to two inquiries about discoloured zinc white paint, he could give no definite explanation. It had been suggested during the meeting

that the paint was probably lithophane; but neither this, nor pure zinc white (oxide or sulphide), or any likely addition to, or adulterant of, these would go black with air or acids. The lead of the driers in the oil had been suggested; and, as Mr. Hainsworth had pointed out, zinc white needed a large amount of oil. Mr. Hill mentioned that this soon rubbed off. If at all deficient in oil, this was exactly what would happen. In his case, where the trouble was in lantern interiors, the daily continued heating might possibly have charred the oil somewhat, and thus have both darkened it and weakened its cohesion; while the dust from the large volumes of air passing through the lantern might have had something to do with the discoloration. Mr. Scholefield, who said he rubbed something like brick dust from damaged oxide paint, would be interested to know that paints had been found with this actual ingredient in them. Mr. Tetley's suggestion about the decomposition of the calcium carbonate in oxide paints seemed to be unlikely. If sulphur dioxide and rain water were able to reach and attack this part of the pigment, it would show that the paint film was already damaged, that the paint was therefore getting porous, and that the way was opening up for ordinary atmospheric corrosion, especially as calcium carbonate was itself a weak safeguard and a source of weakness in paint as regards rust prevention. His statement as to the paint developing a white colour was hard to understand. It might indicate the fading of a lake—*i.e.*, a colour stained on to a white base. Nothing in the normal constitution of many oxide paints would cause any reaction or separating out that would bring about this whitening. It suggested to him that the paint had in some way got water in it. He admitted that barytes as an addition to paints (and even to white lead) was not to be wholly condemned; and among other good points might be mentioned that it really was fairly high in the scale of pigments as a rust preventative. The reference in the paper to quick-drying paint was not intended as a plea for what was technically known as quick-drying paint, whose disadvantages had been fully described by some of the speakers, but as a more general and perhaps ill-defined term. He would leave one thing with them as a final problem for which he could suggest no explanation. If a number of vertical railings were left unpainted, or allowed to fall into entire neglect after painting, the most rapid rusting occurred about two-thirds of the way down. Why was this part the most rapidly attacked?

AMERICAN REGULATION OF THE AMOUNT OF SULPHUR IN GAS.

[From "Progressive Age."]

Only in four States of the Union and in the District of Columbia are there regulations in regard to the amount of sulphur permissible in gas. In all of these, with the exception of Wisconsin, the limit is substantially 20 grains. In the latter State, it has been increased to 30 grains. Massachusetts is now struggling with the proposition to make a similar increase in the limit. At a recent legislative hearing, Mr. Arthur D. Little, chemical expert and engineer, of Boston, presented in brief the results of some most exhaustive experiments recently conducted to determine the influence of sulphur in gas on the air in rooms. He showed that the present local restrictions are the outgrowth of ignorant legislation in England, where, under the Metropolis Gas Act, 1860, Parliament limited the sulphur content of the gas supply in the City of London to 20 grains per 100 cubic feet.

The present Bill before the Massachusetts Legislature provides that "the Board of Gas and Electric Light Commissioners shall from time to time ascertain and prescribe what degree of purity may reasonably be required." At the hearing, the Board recommended that the amount of sulphur allowed in illuminating gas be specifically increased from 20 to 30 grains. This recommendation was adopted at the hearing by the Counsel for the Massachusetts Association of Gas Companies, who declared that the extra sulphur would help the companies to operate cheaper; would prevent their violating the law against their will; and would injure no one. But the Board stated their decision to be that the question of purity is a question of such breadth of public policy that it is fitting for the Legislature to decide it. They say that it has been fixed by the Legislature before, and has been satisfactory; and they therefore see no reason why this policy should not be continued.

The evidence presented by Mr. Little, and based on his experiments, showed that he had been unable to discover any possibility of injurious effects resulting from raising the limit to 30 grains. He presented a summary of the results of the careful investigation made in Wisconsin, which led to a corresponding increase. It was shown that a lower sulphur restriction in gas would greatly limit the gas companies in the coal they could use, and make it necessary for them to pay a much higher price for coals of lower sulphur content. The Wisconsin Commission was quoted as authority for the statement that they could not find that it had ever been well demonstrated that the difference of a few grains in the sulphur content of gas had any appreciable effect upon the air of rooms in which gas was burned, or effects that were otherwise harmful to health or property. It seemed to them that most of the gas restrictions were not founded upon inaccurate knowledge, but rather upon a blind following of precedent set in other places. Mr. Little's experiments, which cover a period of some months, were conducted in a house set aside for the purpose, and include a study of the possible effect of gas under varied conditions. It was shown fundamentally that the sulphur gases formed on the combustion of illuminating gas are removed from the air in three ways: By changing air in the ordinary course of ventilation; by condensation along with water vapours on the cold walls and closets; and through absorption by the alkaline constituents of the walls and ceilings. Mr. Little's experiments show that only within narrow limits does an increase in the sulphur content of the gas, or of the rate at which the gas is burned, cause a relative increase in the sulphur content of the room. In other words, that the disappearance of the sulphur gases increases with the concentration at which they exist in the air. Analysis of the plaster of the experimental room showed that there had been a natural increase in the amount of sulphur which it contained; but calculations showed that the plaster of a ceiling would serve to absorb sulphur gases from 20-grain gas burning 25 cubic feet per day during the probable existence of a house. When the plaster was covered with paper, the absorption was but moderately reduced.

The outside air was found to always contain considerable amounts of sulphur—at times, from one-third to one-quarter as much as in the air of the room in which gas was being burned. It was impossible within the ordinary range of conditions to discover any odour due to the sulphur in the gas. Samples of dyed goods were exposed in the room without discovery of any perceptible fading, and bright metals were in some cases tarnished more by the outside air than that within the room. The analysis of sulphur matches showed that they would liberate as much sulphur into the room as would ordinarily be liberated by 20-grain gas burning for 22 minutes.

In connection with the hearing above referred to, the Chairman (Mr. Forrest E. Barker) spoke as follows:—

In regard to the contention of the companies that they should not be fined if the excess of sulphur is due to an unavoidable cause or accident, I assume that if the Committee inserts such a clause in the Bill it will do so only after it has become fully satisfied as to what such a clause means. I doubt if we know what such a clause would mean. I say what I do with respect to the construing of this clause after what has been said in favour of removing the restrictions on gas. I think that we have the impression that the companies think occasionally that sulphur will suddenly appear in gas from unavoidable cause, coming as a complete surprise to the company. If this is true, I wonder if it is fair to say that such a provision in the law might nullify any restrictions which were made.

Now, in respect to the question of removing all restriction on the amount of sulphur which gas may contain, I want to explain the reference made by the Board to the removal of an obstruction to the reduction in the price of gas. The cost of purification per cubic foot is too small to affect greatly the selling price of gas; but any reduction in the cost of manufacture under proper regulation will eventually work to the advantage of the pu blic, either in making the price cheaper or in giving better service.

I ought to state what you may expect if all restriction is removed. It has been said that about 40 grains of sulphur in the gas would be all that would be found. That is not the opinion of the Board. We should expect to find the same amount here as is found in London. In some extreme cases, 90 grains have been found. That is an extraordinary amount; but there have been a number of times when tests have shown that there were 70 grains present. It is said that the coal used in London contains more sulphur than that used here. If all restrictions are removed, we should expect that the companies here would use coal with a great deal of sulphur in it.

Mr. Barker also stated that he did not believe that anyone knew whether a large amount of sulphur in gas was injurious. In investigating the matter, the Board had had the assistance from the Harvard Medical School and the Institute of Technology; and the recommendations of the Board that the limit be placed at 30 grains was the result of the Board's inquiry. Until the presence of sulphur in gas is shown to be harmless, the Board will not recommend the removal of all restrictions.

Annual Meeting of the Italian Gas Society.

The thirty-eighth annual conference of members of the Italian Gas Society will this year be held in Venice, from Monday, June 7, to Thursday, June 10. The Manager of the Venice gas undertaking, Sig. Ing. Verneau, not being at present a member of the Society, the Editor of our contemporary, "Il Gaz," Sig. Cap. Vittorio Calzavara, has accepted the direction of the necessary arrangements. The meeting in June will be of more than usual importance, as it is proposed to submit to members a scheme for the formation of a new Society under the name of "Associazione fra Gazisti ed Acquedottisti d'Italia"—or, as we should say, Association of Gas and Water Engineers. The suggested articles of the Association, which will be an amalgamation of two formerly separate bodies, have been circulated among the members. There will be four classes of membership—ordinary, collective (*i.e.*, for gas undertakings), associated (*i.e.*, for allied persons and firms), and honorary. Gas apparatus contractors, it is noted, can be elected to the ordinary class. A uniform annual subscription of Lire 20 will be made; but entrance fees for new members will vary according to class—from Lire 20 for an ordinary member to Lire 100 for a gas company. The new amalgamated Association will, we doubt not, bring increased financial and numerical strength into the body of gas and water engineers of Italy. An interesting excursion will be made, at the invitation of Sig. Cav. Sospisio, the Engineer and Manager at Trieste, to the municipal gas-works there, where will be seen the Bolz bed of vertical retorts recently described in the "Journal." Altogether, the forthcoming meeting should prove full of interest and profit; and we wish it, and the new Association when formed, all success.

REGISTER OF PATENTS.

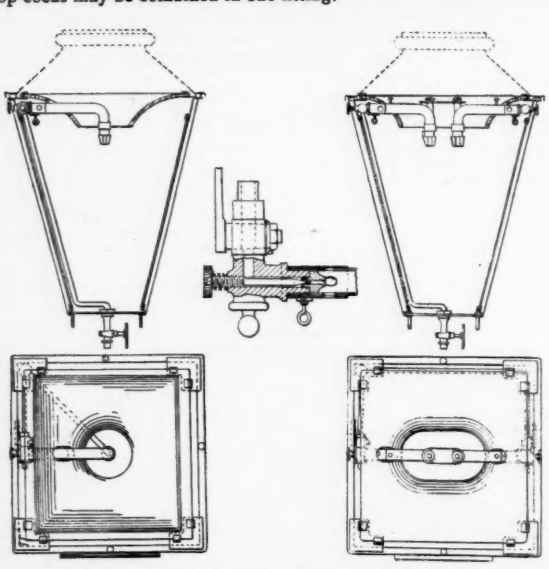
Inverted Incandescent Gas-Lamps.

PODMORE, A. E., of Herne Hill, S.E., and THOMAS, J., of Hanley Road, N.

No 7791; April 8, 1908.

This invention, of "improvements in fittings for inverted incandescent gas burners and lamps," has for its object "to provide improved means for adapting inverted incandescent gas-burners for use in lanterns for street-lighting."

The patentees propose to use, in combination with one or more bent-tube inverted incandescent gas-burners, a reflector formed with a central aperture, around which is a depending lip-part; the reflector gradually curving down from its outer edge to the depending lip-part and being perforated at one or more places to receive the horizontal limbs of the burners. In connection with such an arrangement (the burners of which have each a separate air-regulating sleeve held in the adjusted position by a set-screw), the improvements provide a special form of set-screw to facilitate manipulation. A separate exteriorly projecting gas-regulator for each burner is also provided, which, being accessible from the exterior of the lantern, permits of controlling the gas supply without having to first open the lantern. A separate stop-cock may also be arranged in connection with each of the burners in addition to the supply cock common to all of them, so as to permit of extinguishing any desired burner. In practice, the gas-regulators and stop-cocks may be combined in one fitting.



Podmore and Thomas's Inverted Burner Street-Lantern.

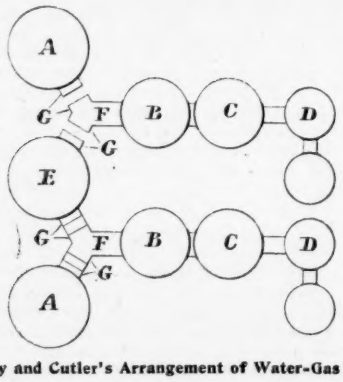
The illustration shows a street-lantern fitted with a reflector, a single burner, and gas and air control devices according to this invention; also a lantern having two burners. The regulating cock employed is shown apart to a larger scale.

Gas-Generating Plants.

BOTLEY, C. F., of Hastings, and CUTLER, SAMUEL, Jun., of Millwall.

No. 8525; April 16, 1908.

As the patentees point out, in plant used for the production of water gas, it is usual to arrange the apparatus in sets—each consisting of a generator wherein the gas is produced, and several subsequent vessels wherein it is carburetted or enriched for illuminating purposes and cleansed. In such sets the generator is subjected to much greater wear



Botley and Cutler's Arrangement of Water-Gas Plant.

and tear than are the subsequent vessels; and hitherto it has been necessary to periodically suspend the operation of the entire set of vessels while the fire-brick linings and other wearable parts of the generator are repaired or renewed. Accordingly, they propose to employ an additional generator, with branches and connections by means of which it can be coupled up to the carburetting and purifying apparatus, usually working in connection with its own proper generator, and be temporarily used in place of the working generator which can be disconnected, and is thus released from duty and can be repaired without shutting down the entire plant. The invention is limited to water-gas apparatus in which the generator is subjected to two distinct operations—namely, the blowing through of air to heat-up the fuel, and the injection of steam through the incandescent fuel to give off water gas.

The illustration shows a duplicate gas-plant arranged according to the invention. The plant consists of two or more sets of working vessels each comprising the generator A, and the subsequent carburetting and cleansing vessels B, C, D. An additional generator E is provided between each pair of working generators that communicate with the carburetting and cleansing vessels on either side through pipes F fitted with stop-plates G. Either of the generators A or the generator E can be isolated for repairs while the others are kept working and in communication with the purifying apparatus. In some cases sluice-valves would be used instead of stop-plates or any other equivalent means of closing the aperture. The generator E serves as a reserve for either of the two working generators A, and is used with either one or other of vessels B, C, D, as occasion may require.

Intermittently Supplying Gas to Lamps.

VON POST, G., of Stockholm.

No. 8720; April 21, 1908.

This invention has for its object to obtain sudden interruptions in a current of gas used (for instance) for feeding lamps in flash-lights.

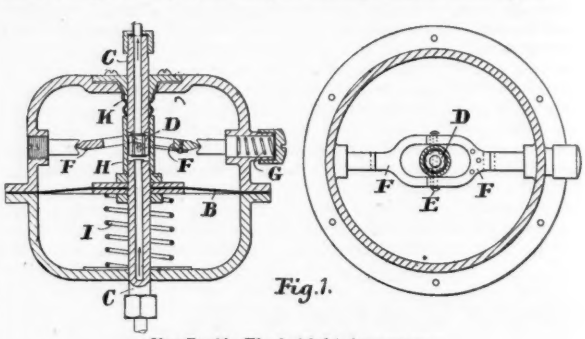


Fig. 1.

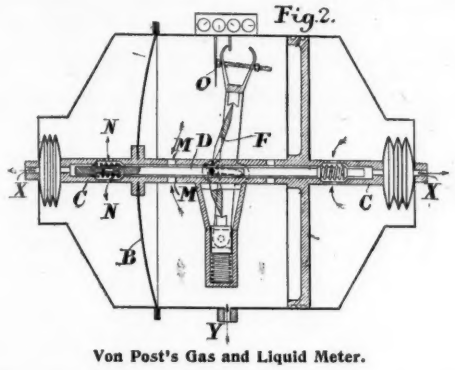
Von Post's Flash-Light Apparatus.

The casing shown in fig. 1 is divided in two chambers by an elastic diaphragm B, through which passes a hollow shaft C, in three parts—two spindles, each provided with a central passage and a connecting screw-collar H, which forms a valve casing, in which a two-sided valve D is enclosed. The valve casing is secured to the diaphragm B; while the valve D, by a transverse pin E, is movably connected to a toggle-joint F, supported by the casing, the stroke of which can be regulated by a spring G acting upon one of its levers or by lengthening or shortening the shaft by turning the screw-collar H in either direction—the two spindles engaged in the collar thereby being moved closer to each other or *vice versâ*.

The valve does not engage tightly with the collar over the whole of its circumference, but only so as to ensure its guidance—thus providing an open space, which communicates with the surrounding space in the casing through the apertures in the collar that serve to guide the pin when the latter actuates the toggle-joint. The pin is loosely inserted in the valve, to facilitate the removing of the latter. By adjusting the screw-collar H, the space in which the valve member D moves may be adjusted.

When, for instance, a gas current is introduced through the hollow shaft in the direction of the arrow, the gas passes around the valve member D and out through the apertures in the collar, and fills the space between the diaphragm and the casing and an elastic collar K, which fits tight around the shaft and is secured to the casing by a washer. The gas in this space presses the diaphragm and shaft in a direction opposite to that of the gas current through the shaft; and the valve member and toggle-joint are thus moved in the same direction. When the motion has proceeded so far as to carry the toggle-joint past its middle position, the action of the diaphragm ceases; and then, instead of the diaphragm, the toggle-joint comes into action, and instantaneously moves the valve member D from contact with the upper spindle of the shaft to the contact with the lower spindle, whereby the gas contained in the chamber above the diaphragm can pass away to the burner through the apertures in the collar and the bore in the upper spindle, as the upper arrow illustrates. When the pressure from above on the diaphragm ceases, a spring I, actuating the opposite side of the diaphragm, forces it back again, in which motion the shaft and the valve member will participate, until the toggle-joint again has passed its central position, when the valve member shuts off the passage through the upper spindle and the motions are repeated.

The apparatus described is especially adapted for lighthouses, buoys, and the like, for obtaining intermittent light. It may also be used for gas and liquid meters, and also for obtaining reciprocating motion by fluid pressure. Its application to gas and liquid meters is illustrated in fig. 2. Here the two-sided valve member D is movable in the hollow shaft C, which is connected to the outlet openings X of the casing by flexible connections. The interior of the casing is divided in three chambers by two diaphragms or pistons B, or by one diaphragm and one piston. F is the toggle-joint and Y the inlet opening for the gas or liquid to be measured. In the position shown, the fluid entering through Y passes through the ports M into the hollow shaft, and, further, through the ports N to the chamber on the left side of the diaphragm—filling that chamber and pressing the diaphragm to the



Von Post's Gas and Liquid Meter.

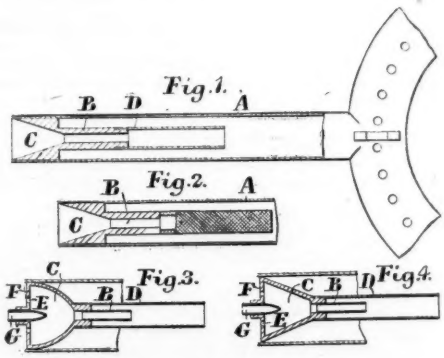
right. The hollow shaft participates in the movement, carrying with it the toggle-joint; and in a certain position of the shaft the toggle-joint is pushed over to its other position, also causing the valve member D to be instantly pushed over in such a position that the fluid from the chamber between the diaphragm and the piston can pass through the hollow shaft to the chamber at the right side of the piston. At each time the toggle-joint is thus thrown over from one position to the other, the valve is immediately opened at one side and closed at the other; so that always the same quantity of fluid is introduced in the chamber before the position of the valve is changed. The toggle-joint in its movement acts upon a lever O, which is connected to a shaft in a dial-train.

Atmospheric Burners.

VAN PRAAG, D. J., of Grosvenor Road, Canonbury, N.

No. 8613; April 18, 1908.

In atmospheric burners of the type in which the gas on being discharged from the service-nozzle passes through a conical mixing-nozzle attached to a supply-pipe of less diameter than the burner-pipe, it has been proposed to provide in a perforated extension of the supply-pipe a tube of wire gauze of substantially the same diameter as the supply pipe. According to the present invention, however, the extension of the supply pipe is formed either of wire gauze or of tubing and of a larger diameter than the supply pipe, and thereby increased economy in consumption is secured, while at the same time this arrangement is said to prevent "burning back."



Van Praag's Atmospheric Burners.

Fig. 1 shows a sectional elevation of the burner; and figs. 3, 4, and 5 show modifications.

In fig. 1, the burner-pipe A is provided with a supply-pipe B, the end C of which (opposite to the service-nozzle) is of a conical convergent character. The diameter of the parallel portion of the supply pipe is considerably smaller than that of the pipe D, which forms an extension of it; while the pipe D is of considerably less diameter than that of the burner-pipe A.

Where the pressure of gas is low, there may be attached a tube of wire gauze (shown in fig. 2) formed of one or more thicknesses, so that the gas, after leaving the supply pipe, passes through it on its way to the burner-pipe.

In figs. 3 and 4 are illustrated forms of the invention in which the service-nozzle G is structurally connected with the burner-tube, the sides of the nozzle C of the supply pipe B in fig. 3 being curved instead of straight as in fig. 4. Holes E are pierced in the base F of the nozzle, in order to supply the necessary air for combustion.

The most important dimension to be determined is the smaller diameter of the conical nozzle of the supply pipe. This may be obtained for a given gas consumption by gradually increasing its cross section until the flame of the burner is perfectly non-luminous. The following proportions are said to give satisfactory results in a burner using about 15 cubic feet of gas per hour when the arrangements shown are adopted: Length of conical nozzle of supply pipe, $\frac{1}{2}$ inch; length of parallel portion of supply pipe, $1\frac{1}{2}$ inch; diameter of ditto, $\frac{1}{4}$ inch; length of extension pipe, 3 inches; diameter of ditto, $\frac{3}{8}$ inch. These proportions may be varied for different rates of consumption. For example, between the rates of consumption of 15 cubic feet and 54 cubic feet per hour, the above proportions may be varied in the following manner: Length of the conical nozzle of the supply pipe may vary from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inches; length of parallel portion of supply pipe may remain constant; diameter of parallel portion of supply pipe may vary from $\frac{1}{4}$ inch to $\frac{5}{8}$ inch; length of extension pipe may vary from 3 inches to $4\frac{3}{4}$ inches; diameter of enclosing tube may vary from $\frac{3}{8}$ inch to $\frac{7}{8}$ inch. With a larger gas consumption the diameter and depth of the conical nozzle and the length and diameter of the supply and extension pipe would be correspondingly larger.

Discharging and Charging Machine for Gas-Retorts.

WEST, J., of Manchester.

No. 9673; May 4, 1908.

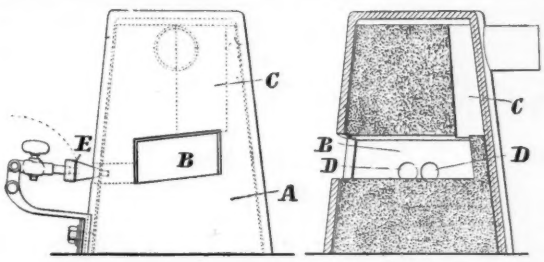
An illustrated abstract of this specification appears on p. 450 of to-day's issue of the "JOURNAL."

Gas-Heated Furnace.

GLOVER, T., of Queen Victoria Street, E.C.

No. 9965; May 7, 1908.

This gas-heated furnace, for soldering irons and other like articles, is formed from a block of fire-brick with a hole or chamber from one side or front (and leading to a flue or chimney) of such a shape and position that the higher or top soldering iron will drop to the bottom when the bottom soldering iron is removed. Thus the operator can manage either iron by one hand, without laying the hottest iron down, while positioning the other, or removing his hand from the work to be soldered. At the same time greater heat is imparted to the furnace by the employment of gas under high pressure.



Glover's Gas-Furnace for Heating Soldering Irons.

As shown, the block A, of fire-brick or like material, is made with a hole or chamber B from one side or the front, for the reception of the soldering irons or other appliances to be heated. This hole—preferably of greater length in one direction than the other—is arranged so that it has a sloping bottom, or is arranged vertically; so that the top iron inserted can roll or drop to the lowest part when the lowest one is removed. The hole B terminates in a flue or chimney C. At or near the base are formed one or more holes D, for receiving high-pressure atmospheric gas-nozzles E; and the block has a cover of cast or wrought iron, having a chimney leading from the flue or opening C of the block.

The gas-flames project against the soldering iron next the burners at the thick part away from the point, and at the same time have action on the walls of the chamber, so as to make it red hot and assist in heating the irons; and so soon as the iron next the burners is removed, the next one rolls into its place so as to be properly heated. The mechanic thus only requires one hand to manipulate the iron.

Extracting Tar, Dust, &c., from Gases.

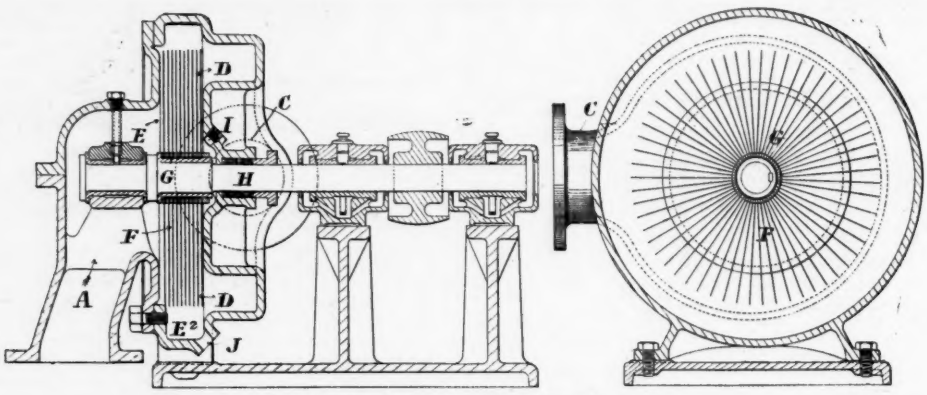
BURSTALL, F. W., of Birmingham University.

No. 10,442; May 14, 1908.

The distinguishing features of this invention (p. 456) are that within the casing through which the gases are made to flow is provided a "rotor" capable of being revolved at a given speed. The rotor is in greater part built up of numerous fine wires, distanced apart and combining during the revolution of the rotor to form "a constantly changing and centrifugally acting sieve and beater" through which the gases must pass, and by which matter in suspension is entrapped and beaten out into a collecting chamber. The flow of gas may be either from the centre of the rotor to near the circumference or parallel to the axis of the rotor; and the water supply may be fed into the centre of the rotor, and be taken off at the boundary collecting chamber. Preferably, the wires are radially disposed side by side and at the back of each other upon a central hub, so that in the thickness of the rotor a considerable number of wires are presented, and sideways the rotor is substantially built of them, with, however, sufficient space between each wire to form circuitous gas-ways. The hub is mounted upon a shaft which drives the rotor at a high rate of speed.

The gas inlet is at A; the outlet at C. An annular chamber communicates with the outlet at D, and with the rotor-chamber between the inlet and the outlet at E. The rotor (diagrammatically shown at F) is composed for the most part of wires mounted radially upon a hub G fixed upon a rotatable shaft or spindle H, supported in bearings. Axially of the rotor the wires are considerable in number, and radially most numerous. They are arranged so that they form a fine wire rotatable brush, each wire of which is distanced apart. The flow of gas is from the centre to near the circumference of the rotor; and thus all gas must flow between the wires in passing from the inlet to the outlet. A water supply is adapted to be brought into the rotor-chamber at I, near the centre, and be taken off at J, which is also the outlet for impurities.

In action, the rotor has a sieving and beating action upon the gas during its flow through the chamber, collecting the tar and other matters in suspension and whirling them into the collecting chamber. The tar particles cling to the wires, and by the centrifugal action are whirled along until they slide or are thrown off the outer extremities



Burstall's Centrifugal Tar Remover.

of the wires. The water is also beaten up and whirled outwardly to the collecting chamber and outlet J.

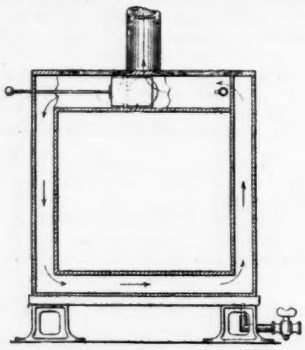
With regard to the object of the invention, the patentee states that no attempt is made to broadly claim the idea of removing tar and other impurities from gases by subjecting them to centrifugal action in an apparatus built with a rotor or impeller; and in the matter of the wires of the rotor, it has hitherto been proposed to replace the usual impeller of a fan by a metallic wire brush. The extractor according to the invention, however, in its operation upon the gases, is quite distinct from other proposed rotors for the same object; and with regard to the metallic wire brush of the fan, the same object is not in view.

Gas Cooking-Stoves.

CANNON, D. W., of West Hendon.

No. 21,016; Oct. 27, 1908.

This gas cooking-stove is of the class "in which the interior of the oven is inaccessible to the gases of combustion from the burners; the oven being enclosed in an outer casing forming a flue or flues, in which the gases of combustion circulate around the oven in an unbroken course and continuously in the same direction circumferentially before passing to the uptake." The inventor proposes to provide such



Cannon's Gas Cooking-Stove.

an oven (as shown) with a heating burner in the upper flue and with an auxiliary burner exteriorly of the stove, to heat the outer casing and thus impart preliminary heat to the air in the flues, or in one of such flues, for inducing a draught when starting the stove. This auxiliary burner may also be used to impart heat to the adjacent portion of the oven by radiation from the outer casing of the stove.

Gas-Cocks.

SPARKS, E., of Tufnell Park, N.

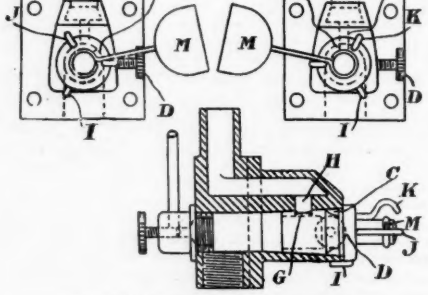
No. 27,005; Dec. 12, 1908.

This improvement in gas-cocks, intended to be opened and closed automatically, consists in arranging two parallel chambers with a passage between and having a plug with a hollow bore fitted with a lateral hole adapted to register with the passage. The plug of the cock is both hollow and provided externally with a special form of stop comprising three claws, one of which engages the bracket of the plug to limit its movement, while the other two are struck by a suitable operating device.

The illustration shows, in front elevation, one form of the cock and a vertical section of the casing and plug.

The plug (a taper fit in its casing) is provided with a peripheral groove C into which fits the point of a set-screw D threaded through the casing, so that the plug is retained within the casing while, however, being free to turn therein. As shown, the cock is designed for use in conjunction with the mechanism described in patent No. 11,751 of 1902.

In the plug is a passage G, and with a fixed claw I bent under the lug-casin and serving to limit the rotation of the plug. The passage is adapted to register with another passage H in a partition in the casing. Claws or projecting arms J K are also fixed upon the plug in the positions shown, so that the weight of a lever arm M (loosely pivoted on the projecting end of the plug) falling on either arm will turn the plug in that direction until the claw I stops its movement. When the lever is again tilted over through the vertical until it falls upon the opposite arm J or K, it will turn the plug in the opposite direction. These two positions of the plug correspond one with an open and the



Sparks' Automatic Lighting Cocks.

other with a closed position; so that in the one case gas passes, and in the other case gas cannot pass out through the passage G. The action of the falling lever arm is in a downward direction on to the projecting arms, which arms, it will be noticed, are arranged one on each side of the outlet or passage G.

APPLICATIONS FOR LETTERS PATENT.

10,417.—NEWHOUSE, W. A., "Supports for mantles." May 3.
10,456.—PRALON, L., FRANCON, I., and FOURNIER, G., "Distributing gas, &c." May 3.
10,473.—MÜCKE, J., "Burning-off mantles." May 3.
10,518.—PROSSER, H. R., "Burners." May 4.
10,562.—MURRIETA, C. DE, and TULLY, C. B., "Separating liquids from gases." May 4.
10,603.—CUTLER, S., JUN., "Charging vertical retorts." May 4.
10,648.—HONIG, A., "Meters, pumps, &c." May 5.
10,664.—GLOVER, R. B. G., "Regenerative burners." May 5.
10,672.—LOOMIS, O. P., "Indicating explosive pressures in gas-engines." May 5.
10,706.—ANDERSON, D., "Controlling gas." May 5.
10,723.—WHITEHEAD, H. F. C., "Reducing valves." May 6.
10,743.—BRAY, A., "Supporting globes of inverted burners." May 6.
10,745.—WEICKERT, M., "Mantles." May 6.
10,765.—OTTO-HILGENSTOCK COKE-OVEN COMPANY, LTD., "Removing tar from hot gases prior to the recovery of ammonia." A communication from C. Otto and Co. May 6.
10,903.—MÜCKE, J., "Mantles." May 8.
10,906.—BARNETT, H., and BROWN, T., "Compressing gas, air, or vapour for gas-lighting purposes." May 8.
10,934.—HANSFORD, J., and WRIGHT, J. F., "Prepayment apparatus for the supply of gas." May 8.
10,941.—WADDELL, A., and BRYAN DONKIN COMPANY, LTD., "Gas-mains." May 8.
10,945-6.—EHRICH AND GRAETZ, "Inverted lamps." May 8.

Birmingham Water Supply.—The report of the Birmingham Water Department for the twelve months ended March 31, shows an increase of £5903 in water-rents, including, for the second half of the year, £2500 received from Coventry in respect of the supply from Shustoke. The total increase is at the rate of 2·05 per cent., or 1·18 per cent. omitting the Coventry supply. The revenue shows a gross profit of £201,304, as against £198,552 a year ago. The charges on capital account amount to a net total of £281,962; and there is thus a deficiency for the year of £80,658. The deficiency has been covered by: Contribution from the borough fund and rate account, £65,000; transfer, to cover the balance, from capital account, under section 22 of the Birmingham Corporation Water Act, 1902, £15,658. As regards the estimate for the coming year, the Committee have requested the Finance Committee to provide from the rates the sum of £65,000; being the same amount as in the account now presented. The average daily distribution of water for the year within the area of supply was 19,393 million gallons, compared with 18,549 millions the previous year.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Local Government Board Audits and the South Metropolitan Gas Company.

SIR,—We annex the Local Government Board Auditor's full judgment on the Gas Company's contention for a surcharge on the Bermondsey Borough Council. It will be seen that it exonerates us, and disposes of the Company's main contentions.

It is no easy task to trace, through the extended reports, the objections raised and reported in the "JOURNAL" and in all the local Press—involving in one instance a search of thirty-four paragraphs and reports. But the Company's points may be summarized in the following extracts from the newspaper reports.

That the whole or the greater part of the charges were included in the contract quinquennial commission. This is absolutely negatived by the Auditor's first paragraph.

That we had taken advantage of our employment by all four parties to the appeal to charge each £5 5s. a day on work common to all—in fact, that we had "charged four times over for everything," and that we had charged "120 guineas for ten conferences," &c., &c. The Auditor, in the third and following paragraphs, disposes of this equally absolutely, and records that for joint work—*i.e.*, for the benefit of the four separate litigants—our maximum was £10 16s. a day, and that we had also charged less than the time occupied. In fact, it was proved to the Joint Auditors that, pooling the accounts as if for one party, we had received in the whole districts nine guineas a day for the joint work—a sum exceeded in every other instance without objection where supporting witnesses had been acting for other bodies, but limited to two employers against our four-fold responsibility and as leaders.

The last paragraph, on the main question of letters, is the one exception. There the Auditor judged the scale for letters at 1s. 6d. less than our charge—reducing it to a solicitor's scale, whereas we had followed the admitted custom with surveyors.

To focus the results. The objectors claimed to surcharge our four sets of clients to a total of £2107. The actual results, after five months' tests before separate Auditors, are as follows: In two Unions, the payments have been confirmed; the Company in one case not putting in an appearance. In the third, as the Auditor confirms, we voluntarily allowed an abatement which we had offered in our first account.

One body only of the four is threatened with a surcharge to the amount of £143 16s. (the objectors claiming £846). There the Guardians protest that their payment is regular, and resist the surcharge.

As our last words on the subject, we and our employers have been exposed to great labour and risks by these unfounded objections. We shall, however, continue our duty fairly and without prejudice, with the hope that under the new auspices more peaceful counsels will prevail with the Company. We have confidence that differences will be narrowed in the future, to the advantage of both ratepayer and shareholder.

Seeing the wide circulation given to the Company's reflections on our alleged "exorbitant" charges, we venture to ask prominence for the annexed official refutation.

THOS. DINWIDDY AND SONS.

54, *Parliament Street, S.W., May* 14, 1909.

[ENCLOSURE.]

BERMONDSEY BOROUGH COUNCIL.

Report of the Local Government Board Auditor, E. Carson Roberts, Esq., on the South Metropolitan Gas Company's Objections to Messrs. Thomas Dinwiddy and Sons' Appeal Charges.

Objections based upon several grounds were raised against the payment of £775 15s. to the firm of Valuers, Thomas Dinwiddy and Sons, for their services and expenses in connection with the South Metropolitan Gas Company's rating appeals.

It was suggested that much (or some) of the work for which special charge was made at five guineas per day, was in fact covered by the previous payment of 15s. per cent. for the original valuation. I have examined the accounts of the special work, and do not find any items which are open to this objection.

A more important question was raised, as to whether the fact that three other authorities were also being charged for some of the days spent upon joint work was not one of which account should be taken in deciding as to the lawful and proper amount to be paid for this work. I have held that this fact, being known to the Council at the time when the bill was presented for their consideration, was one which should have been inquired into and dealt with before settling the payment.

On inquiry at audit, I found that the days for which charge was made at the full contract rate of five guineas in the Bermondsey bill, did not include all the days which had been spent upon joint work on behalf of the Bermondsey Council and other respondent authorities; and that the charges included in the bill in fact worked out at £10 14s. per day on the Bermondsey proportion of this joint work.

I have given what I think is reasonable weight to the argument that, on account of the added responsibility, something more than a fourth or a third of the day rate should be paid by an individual employer in respect of a day devoted to joint work on behalf of four or three employers; and in reducing the charges made in the Bermondsey bill, I have allowed on the basis of eight guineas a day for such work.

The charge at the rate of 5s. each for 121 letters has also been reduced by £10, on the ground that it was excessive—more particularly in view of the fact that some of these letters were practically identical communications to the several authorities.

The total amount which I have disallowed out of this bill is £115 17s. 9d.; and this disallowance has been fully satisfied by a refund of £122 17s. [N.B.—Messrs. Dinwiddy had, in May, 1907, offered a rebate of this amount, £122 17s., on condition that their account was promptly settled without contention.]

(Signed) E. CARSON ROBERTS.

The Clacton Flour Mills (among the oldest of their kind in Essex) were burnt to the ground on Saturday; and the loss is estimated at £8000. It is thought that the origin of the fire was an escape from the suction-gas plant in use at the mills.

PARLIAMENTARY INTELLIGENCE.

GASLIGHT AND COKE COMPANY BILL.

This Bill last Thursday came on for consideration in the House of Commons, "by order." On the formal motion being made,

Mr. W. THORNE, who for some weeks past has had a notice on the paper for its rejection, said it was his intention to detain the House for only a few moments. The Bill had a very far-reaching effect—it affected thousands of gas consumers in the borough of West Ham and district. The reason he had put down the resolution that stood in his name was because there had been some disagreement between the Gaslight and Coke Company and the West Ham Corporation. But he was under the impression that between now and the final stage of the third reading of the Bill, there was a possibility of an agreement being arrived at between the Company and the Corporation; and for this reason he did not intend to move his resolution.

The Bill was then formally considered, and ordered to be read the third time.

HARROGATE GAS BILL.

The Unopposed Bills Committee of the House of Commons presided over by Mr. ALFRED EMMOTT had again before them the above Bill (see *ante*, p. 381) last Thursday.

Mr. BROWN, on behalf of the Parliamentary Agents for the Bill, said it was before the Committee last week, but the further consideration was adjourned for a week for the purpose of considering a communication received from the Home Office, in which two points were raised—one in regard to the powers the promoters took in clause 28*a* of the Bill, which the Home Office said would enable them to supply power gas, and the second with regard to the exemption of fittings, in certain circumstances, from the law of distraint. On the first point, the promoters proposed to take power for the occupiers of certain premises to generate power gas on the premises. The Speaker's Counsel thought the promoters ought on this point to insert the clause suggested by the Home Office. This clause he proposed to insert in the Bill. The clause was for the purpose of protecting persons occupying premises in which power gas was used. On the second point, clause 29 of the Bill proposed to exempt gas-fittings let on hire from being taken in distress. There was also a special clause only exempting the Company, after the passing of the Act, if the fittings were marked. The Company's fittings on hire were of the total value of £7000; and the Company wished to prevent their being taken in distress or under bankruptcy proceedings. The practice of letting fittings on hire was common.

Mr. CALDWELL (Vice-Chairman of the Committee) asked what was to hinder the promoters from putting their mark on fittings which were their property?

Mr. BROWN: Nothing at all, if we can get access to them.

It was subsequently arranged to strike out from sub-clause 3 of the Bill the words "in the case of any fittings which the Company may let on hire after the passing of this Act." Subject to this arrangement, the Bill was ordered for reporting.

OLDHAM CORPORATION BILL.

Local Legislation Committee—Wednesday, May 12.

(*Before Sir* FRANCIS LAYLAND-BARRATT, *Chairman*, *Mr.* HARRISON BROADLEY, *Mr.* J. S FLETCHER, *Mr.* E. GARDNER, *and Mr.* HALL.)

The Bill promoted by the Oldham Corporation (*see ante*, p. 388) was again under consideration to-day, for the purpose of adjusting clauses in regard to gas and water.

Mr. JEEVES (who appeared with Mr. BALFOUR BROWNE, K.C., and Mr. WEDDERBURN, K.C., for the promoters) stated that there were two sets of clauses now before the Committee—one with regard to water, the other with regard to gas. He proposed to deal first with the water clauses, because it was recognized that there had been a decision of the Committee there. First of all, by reason of the arrangement with regard to the gas, they were able to absolutely repeal both section 96 of the Act of 1865 and section 55 of the Act of 1880. The decision of the Committee only went to the repeal of these two sections so far as the water was concerned; but they got rid of them for both purposes by reason of the agreements. Also, part of the gas agreement involved the repeal of section 30 of the Act of 1886, which prescribed a certain limitation of profits. It would be more convenient for them to deal with this when they came to the gas. Then there were certain consequential alterations as to omiting clause 64*a*. This was on gas. The first new clause was the application of water revenue. There they had followed, to a very considerable extent, the clause as it was settled in Bolton, and as it had been settled in many other cases where the application of water revenue was dealt with. The only thing was that they had had to provide for the exceptional cases of the Oldham Corporation, because part of the consideration that they paid for their undertaking was in the shape of permanent annuities, or, at all events, irredeemable annuities; and they had to provide for them. Then there was a question with regard to the reserve fund; and the arrangement that was come to there was this—that there should be a limit to the reserve fund of £80,000, and that not more than ½ per cent. on the aggregate capital expenditure should be paid to the reserve fund in any one year, except in such years as the amount in the reserve fund was less than 25 per cent. In such cases the Corporation were to be entitled to have the whole of the amount of the profits they made. The reason for this was that a provision was made for using the amount in the reserve fund in the management and general purposes of the water undertaking. But while this was done, they had to pay 3 per cent. from the revenue

to the reserve fund. The intention was that, by means of the reserve fund being utilized in this way, there should be found the necessary working capital; and this working capital for the water was a matter of £25,000. That abolished "carried forward." The way this would work was that any profits they made up to £25,000 would have to be put into the reserve until it became £25,000. The alternative would be to keep them in "carry forward," and have a reserve in addition, because they must have a sum of £25,000 to carry on with. In the next sub-section, they provided as to the transfer to this new reserve fund of any money that might be standing to the credit of the old reserve fund—they provided that it should be transferred. This money, as a matter of fact, might, instead of being applied to the reserve fund of the Corporation and pass under their powers, have been transferred to the borough fund; but they had agreed that the proper way to deal with it was to transfer any money in this reserve fund to the new reserve fund. In the first sub-section, they had dealt with the purposes for which this reserve fund might be applied. They were: "Meeting expenses caused by accidents and other contingencies, or to answer any deficiency at any time happening in the income of the Corporation from the water undertaking, or to meet any extraordinary claim, demand, or expenditure in respect of the water undertaking, or to the renewal of works or mains." In the clause they repealed, they had a power for utilizing the old reserve fund for the purposes of enlarging or improving the works. Sub-section 3 merely dealt with the provision that, when the annual proceeds of the annuity redemption fund should be equal to the amount they had to pay for annuities, then the whole of the income should be transferred to the revenue of the water undertaking for the benefit of the consumer. Then there was the question of inspection; and they had agreed with the authorities that they should be entitled to inspect once in each year, each authority, and that the inspection should not go more than three years back. The next new clause was a limitation for water-rent for other than domestic purposes beyond the borough. By this clause the rent payable to the Corporation for a supply of water other than for domestic purposes outside the borough should not exceed the additional rate already paid in respect of domestic supply. This was in exact accordance with the decision of the Committee. Counsel proceeded to deal briefly with other new clauses concerning water.

In the course of discussion,

Mr. BOYCE (representing the Local Government Board) suggested, with regard to the provisions concerning using the reserve fund for the purpose of working capital, that it would be much better to take borrowing power for working capital instead of taking the income from the reserve fund or the *corpus*, as he understood they might take, of the reserve fund.

Mr. JEEVES said they could utilize the *corpus*, but they could not take it—it was always there. What they had to consider with regard to the reserve fund was that it was money which they were not bound to set aside for this purpose. It was money set aside for special purposes of the undertaking; and one of these special purposes—both the Corporation and the petitioners agreed with regard to it—was essentially working capital. What it meant was that, to the extent that they utilized it for the time being for working capital, they had reduced their "carry forward." The effect of this would be that there would be no need for any carry forward. Whenever, after they had got their reserve fund to a given state, there was a sum sufficient to allow a reasonable reduction of water-rent, it would be applied automatically.

The CHAIRMAN: If we grant this clause, it is not to be taken as a precedent in any way for dealing with any other water authority. The Oldham Corporation had certain rather large out-of-the-common powers with regard to their water revenues; and what we are dealing with now is that we are modifying their powers on the application of the people in the outside area. Any decision we give is based only on the special circumstances of the case, and the rights and legal position of the Corporation and of the opponents.

Mr. JEEVES said there was another factor of distinction on the top of those mentioned—namely, that the clauses, as here, were the clauses the petitioners, as well as the Corporation, asked them to put in.

The CHAIRMAN said that was right.

Clause 18*a*, dealing with the application of water revenue, was passed, as also were clauses 18*b* [limitation for water-rent for other than domestic purposes beyond the borough] and 18*c* [gratuitous supply of gas and water to hospitals], the latter with a slight amendment.

Clause 64*a* was next brought up and considered. It was as follows:

Application of Gas Revenue.

(1) As from the commencement of the financial year next after the passing of this Act, the Corporation shall keep accounts in respect of their gas undertaking separate from all their other accounts, distinguishing therein capital from income, and shall apply the revenue of such undertaking as follows—that is to say: Firstly, in payment of the costs charges and expenses of, and incidental to, the collecting and recovering of the revenue of the gas undertaking; secondly, in payment of the working and establishment expenses and costs of management and maintenance of the gas undering; thirdly, in providing the moneys required to pay the annual sum for the time being payable by way of annuities created for the purchase of the gas and water undertakings and apportioned to the gas undertaking, and the interest on the moneys borrowed or reborrowed by them in respect of their gas undertaking; fourthly, in providing such portion of the annuity redemption fund provided in pursuance of the provisions of the Oldham Corporation Gas and Water Act, 1853, as is applicable to the annuities apportioned to the gas undertaking and the requisite appropriations, instalments, or sinking funds for the repayment of the moneys borrowed for the purposes of the gas undertaking; fifthly, in payment to the borough fund of an annual sum of £7500; sixthly, in making good to the borough fund any deficiency in the revenues of the Corporation in respect of the gas undertaking which may at any time hereafter have been provided out of the borough rate or borough fund; seventhly, in providing a reserve fund for the gas undertaking, if they think fit, by setting aside in any one year such sum not exceeding an amount equal to 1 per cent. of the aggregate capital expenditure on the undertaking, or, if the amount standing to the credit of the fund shall be not less than £50,000, such sum, not exceeding £1000, as they shall think reasonable, and (subject as in this section hereinafter provided) investing the same, together with the sum hereinafter in this section directed to be transferred to the said fund, and the resulting income thereof, in statutory securities, and accumulating the same at compound interest until the fund so formed shall amount to a sum equal to one-tenth of the said aggregate capital expenditure, which fund shall be applicable as the Corporation think fit in meeting expenses caused by accidents and other contingencies, or to answer any deficiency at any time happening in the income of the Corporation from the gas undertaking, or to meet any extraordinary claim, demand, or expenditure in respect of the gas undertaking, or to the renewal of works or mains, and so that, if the fund shall at any time be reduced, it may thereafter be again restored to the limit hereinbefore prescribed, and so often as such reduction shall happen. Provided that the Corporation may resort to the said reserve fund for the above purposes, notwithstanding that the same may not at any time amount to the limit hereinbefore prescribed. Provided also that the Corporation may use any moneys for the time being standing to the credit of the said reserve fund for and in the management and general purposes of the gas undertaking, and in such event they shall pay to the credit of the fund, out of the revenue of the gas undertaking, interest at the rate of £3 per cent. per annum during the period of use on so much of the fund as shall be so utilized. And any balance remaining in any year shall be carried forward to the revenue account of such undertaking for the next succeeding year, and shall, whenever and so soon as there shall be an amount sufficient for the purpose, be applied to the reduction of the gas charges equally throughout the limits of supply.

(2) Any sum standing to the credit of the gas-works reserve fund formed in pursuance of the powers contained in section 55 [reserve funds to be set apart for gas and water purposes] of the Act of 1880, after deducting therefrom any payments in respect of liabilities incurred before the 25th day of March, 1910, and which but for the repeal by this Act of such section might have been, and which the Corporation shall direct to be made therefrom, shall be transferred to the reserve fund by this section authorized.

(3) The annual proceeds of the portion of the annuity redemption fund provided in pursuance of the provisions of the Oldham Corporation Gas and Water Act, 1853 (notwithstanding anything to the contrary in section 48 of that Act contained), in any year in which the same shall amount to a sum equal to, or greater than, the annual sum for the time being payable by way of annuities apportioned to the gas undertaking, and the annual proceeds of the reserve fund by this section authorized, when such fund shall for the time being amount to the limit in this section hereinbefore prescribed for such fund, be carried to the credit of the revenue of the gas undertaking.

(4) Each of the Local Authorities within the limits of supply of the Corporation may, once in each year, after giving reasonable notice to the Corporation, inspect such separate accounts by a person appointed by such local authority for that purpose, provided that any such inspection shall be limited to the accounts for the three complete years last preceding the inspection.

Mr. JEEVES explained that the same principles exactly applied to the gas revenue; but there was a different position. The position had been that in the past the gas charges of the Corporation had been altered from time to time by agreement or by Act of Parliament. Originally, the only limitation on the Corporation with regard to the charges for gas was a maximum price, as in the case of water. Then, under the Act of 1880, they heard that, incidentally to the water part of the Bill, there was an agreement come to whereby these extra charges were to be limited to 2d. per 1000 cubic feet. This, again, came up for review in 1886, and the extra 2d. was abolished. But as against this, the Corporation were to be entitled to charge 6 per cent. in respect of the capital moneys. Out of this 6 per cent. they, of course, had to pay the sinking fund and interest; but this defined the margin of profit they might make. Incidentally, also, with regard to the gas, there was the same position with regard to free gas and free water. In point of fact, they had the free gas as they had had the free water. The outside authorities in 1886 contested this before the Courts, up to the Court of Appeal; and it was held that the Corporation were entitled to have it in addition to what profits they could make out of the percentage allowed under the Act of 1886. On this percentage a profit had been made, in addition to whatever the year's supply was worth, of a certain number of thousands, varying according to the position of the capital account every year since 1886. The arrangement that had been come to with the petitioners was that they would abolish this 6 per cent. altogether, and determine once and for all, they hoped, the sum which, whether the undertaking got larger or remained as it was, should be transferred to the borough fund at the expense of the consumers—the expense, of course, of the consumers in the borough as well as in the outside districts. This had been agreed at a sum of £7500. With this exception, the clauses followed absolutely the clauses with regard to water. The only other difference from the water was that there was the differential charge for water for domestic purposes, and no differential charge for gas.

Mr. BOYCE: The £7500 a year you take for the public supply?

Mr. JEEVES: No; not for the public supply. It is the amount of profit which may be made from the gas undertaking by the borough fund of Oldham. With regard to the free supply, of course the clause we have already dealt with deals with that. We abolish the power of free supply; and we are to pay according to the rate we have talked about.

The CHAIRMAN: Your charges for gas are now equal throughout the whole of the area?

Mr. JEEVES: Yes; and they have been since 1886, both for public and private purposes.

Mr. FLEETWOOD PRITCHARD (who appeared with Mr. Honoratus Lloyd, K.C., in support of the petition of the Failsworth Urban District Council): The Corporation for public purposes took free gas.

The CHAIRMAN: But now they are obliged to pay for the gas they take.

Mr. JEEVES: That is to say, we conceded on the one hand what you had said was right with regard to the water.

Mr. BOYCE: What is your actual charge for gas now?

Mr. JEEVES: The lowest charge is 1s. 9d. per 1000 cubic feet—it is round about 2s. on the average. Our maximum charge is 4s. 6d.

Mr. HALL: What would be the value of the gas supplied free to the Corporation? What has it been estimated at?

Mr. JEEVES: If you worked it out at the 1s. 9d. rate—that is, the full rate without any 10 per cent.—it would be something like £7000 last year—I am speaking from memory. Since 1886, it comes to a sum of something like £50,000.

Mr. HALL: So that you are now going to pay for it and get £7500 back?

Mr. JEEVES: But, in addition to this, out of our 6 per cent. we made a profit of £7000 or £8000. We have practically agreed with our

opponents really to halve the profits that we have made in the past; and that portion in the past has been an increasing one.

Mr. BOYCE: Then there is the 10 per cent. which they can charge for public lighting.

The CHAIRMAN: But they have to do the same for the outside area. I think your position practically is this—that your gas profits, *plus* your free gas, were practically equivalent to £15,000 a year.

Mr. JEEVES assented.

Mr. PRITCHARD: We say it was rather more than that.

The CHAIRMAN: I am taking it on the basis on which the negotiations were carried out. The outside people said: "We will let you take half of the old charge for gas." The fact is that you are giving the borough fund the profits, excluding what they made by free gas.

Mr JEEVES: That is really what it comes to. We retain the profits, and we give up free gas.

Mr. PRITCHARD: It is not quite as much profit, as a matter of fact.

Mr. BOYCE: Are they going to use this reserve fund for gas working capital? Does what you said as regards water apply to gas?

Mr. JEEVES: Exactly.

Mr. BAKER (who appeared as Parliamentary Agent for the Saddleworth Urban District Council, and the Springhead Urban District Council) said he had a point to raise on this clause. He understood it was agreed between the parties that the £7500 should be non-cumulative—that if the Corporation did not earn sufficient to pay the £7500, they should not pay it out of future profits, or build up a fund possibly which might amount to a very large amount, and pay it in some subsequent year; but that each year should stand on its own basis. If there was sufficient to pay the £7500 it should be paid, and not otherwise. This was not quite expressed in the clause as printed.

The CHAIRMAN: The clause reads: "Shall, out of the revenue of such undertaking," do as follows. And then it did certain things. It was out of the revenue of the undertaking.

Mr. JEEVES stated that Mr. Booth, who instructed Mr. Pritchard, and who had been very instrumental in all these negotiations, agreed that the position was a sum of £7500 per year. Of course, if in any year they did not happen to make their income, they would be entitled to go to the reserve fund for that as for any other purpose, just as in the old days they could get their full 6 per cent., whatever happened. But the position, as put here, absolutely carried out the arrangement that was agreed between the parties.

Mr. PRITCHARD agreed. This was the arrangement that was come to. He quite appreciated the fact that, as a matter of practice, at any rate they would get their £7500 a year regularly.

Mr. BOYCE: But would that be obtained under the alternative "sixthly"?

Mr. JEEVES: It comes under the words "deficiency of income." If the income was not sufficient without, then the £7500 would be made up out of the reserve fund.

The CHAIRMAN: Your position is this, that the Oldham Corporation own at present a profit-making undertaking, and under the new arrangement the outside area becomes a partner in the undertaking; but you get in exchange a fixed annuity for handing over your exclusive interest. That is what it comes to.

Mr. JEEVES said that was so. He was told that the profits of last year were £9000.

Clause 64A, with a slight amendment, was then passed and added to the Bill.

On clauses 55 and 56—"Appropriation of lands for storing gas, and power as to manufacture of residual products," &c., the Local Government Board made the following report:—

In connection with the proposed appropriation of lands under these clauses, the Board suggest that, unless the lands have been acquired, and are now held by the Corporation for purposes of the gas undertaking, the Committee should consider whether provision should not be made in the Bill for the payment to the fund out of which the lands were purchased of a reasonable sum, by way of rent or otherwise, as consideration for the appropriation to the purposes authorized of land acquired for other purposes. For precedent, see the proviso to sub-section (1) of section 25 of the Manchester Corporation Act, 1908. In this connection, it is to be observed that, according to the deposited estimate, the borrowing power of £200,000 referred to in paragraph (i) of clause 97 includes an item of £1800 for the purchase of lands and easements, although no express authority for such purchase is given by the Bill.

Mr. BOYCE inquired whether the estimate referred to in the report had been brought before the Committee.

Mr. JEEVES understood that the lands on which it was proposed to erect this new storage capacity were already lands appropriated to gas-works purposes. He was told they were only appropriated in this sense—that they had been purchased by the Corporation with this particular object, and they adjoined land actually used for this purpose. With regard to the question of the necessity of this storage, probably the better thing would be to put in a witness to tell the exact position. They had had a certain amount of this information; but they would hear that there was urgent need for the additional storage proposed to be provided under these clauses.

Mr. *T. Duxbury*, the Gas Engineer to the Corporation, gave evidence to the effect that the site proposed was suitable for the requirements, and the Corporation had exclusively purchased it for the purpose. The increased consumption urgently demanded additional provision in the way of storage capacity. At present they had only storage capacity of about twelve hours at the Hollinwood works, which had caused them to use the carburetted water-gas plant in the winter, in foggy weather, at its fullest extent. Should the water-gas plant break down, they would practically be without gas within twenty-four hours. The effect of the additional storage would be that they would probably use the water-gas plant simply as an emergency plant.

Clauses 55 and 56 were passed, after further discussion between the parties, as also was clause 57—"Anti-fluctuators for gas-engines," and other clauses.

Mr. *Duxbury* subsequently gave evidence as to the estimates of the works proposed to be carried out.

A long discussion ensued, in the course of which

The CHAIRMAN intimated that the Committee were very doubtful whether, in the absence of a plan, and in the absence of much more carefully prepared estimates than they had before them, they were willing to absolutely give the borrowing powers asked for.

The new clause 18*d* was passed in the following form:—

The Corporation shall in each year credit the revenue account of the water undertaking, or the gas undertaking, as the case may be, with an amount for the water or gas consumed for public purposes or used by the Corporation for their own purposes, calculated in each case at such rate not being more than 10 per cent. below the rate chargeable and charged to private consumers for a corresponding supply as they shall determine. Provided that the same reduction (if any) shall be made in the rate charged for water or gas supplied for a like purpose to every local authority within the limits of supply of the Corporation. Provided also that the rate charged for all water supplied to public baths within such limits shall, if the same be situate within the borough, be at the rate of 5d. per 1000 gallons, and if situate outside the borough, at the rate of 6d. per 1000 gallons.

Mr. *William Newbigging*, recalled, testified that at the time the estimates were made out he satisfied himself that the amount that they had down as to the cost of the tar-works, as the cost of the residual works, was a right and proper sum. So far as the estimate was concerned for the other portion of the works, he also went through the Engineer's estimates and saw that they were right. But in the estimate he made, he put it in rather a different form. He first of all ascertained to what extent the works were deficient, and then he looked forward and endeavoured to ascertain what amount they would be likely to require during the coming ten years. In order to do this, he went back ten years to see what growth had taken place during that period. Roughly, this was the way in which he based an opinion as to the amount of capital that would be required by the Oldham Gas Department during the next ten years. This was in reference to both works and mains—new works. With regard to stoves and prepayment meters, the amount the Corporation were asking for (£60,000) was just about the figure that he would have asked for, not knowing what had been spent during the last ten years. They knew that the cost of works was so much per million cubic feet of gas sold, and that the cost of distributing plant was again so much per million cubic feet sold. Without any arrangement, it so happened that the amount of £60,000 which they were asking for was just about the figure. He handed in tables, and said he had divided the money up in the way suggested by the Committee. The new gasholder was £51,600. This was based on the capacity; and he had taken it at £10, the same way that Mr. Duxbury had done. He next gave evidence as to purifiers and buildings, and, with regard to new works, said that the Corporation had not asked quite as much money as they should have done. They should have asked for more. He would have advised them to do that had they not already settled the sum before he was called in. With regard to the division of the £60,000, £25,000 had been put down for mains, £30,000 for stoves, and £5000 for prepayment meters. For the purpose of the life, he would put together stoves and meters. With reference to the thirty years, the prepayment meters and the stoves had a short life; but the mains had a long one—40 or 50 years. As a matter of fact, they were taken out because they got too small. Say the average life as between the meters and the mains would be 30 years. When he saw this sum of money down at thirty years, he thought that they would have to go before the Local Government Board for the capital, and they would then apportion it out into its right parts. They always took the average life of a gas-works at 30 years.

Mr. *A. Andrew*, General Manager of the Oldham gas undertaking, stated that they put in a sum for mains which was equivalent to what they had spent in the last ten years. From his knowledge of extensions, he had no reason to suppose that the rate of increase in the requirements of new and enlarged mains the next ten years would be less than in the last ten years; on the contrary, he expected it to be more. He had applied the same reasoning with regard to meters and stoves for the purpose of getting at the estimate of £35,000. The gas authority had considered the question of the holders at Hollinwood, and had decided to proceed with the work subject to the necessary borrowing powers. They had also decided to proceed with the additional storage at Higginshaw, after the one at Hollinwood.

The CHAIRMAN said: After consideration, and in view of the evidence which has been given by Mr. Newbigging, the Committee are prepared to grant these sums; but at the same time I think they are unanimous in agreeing with me that it would have been much more satisfactory if some plans had been submitted with regard to the works that were carried out, and we had had more definite evidence as to the resolutions of the Council.

On the consideration of the question of the periods,

The CHAIRMAN inquired, after what had been said by the Committee, what it was asked they should give them thirty years for.

Mr. JEEVES said they would ask the Committee to give the thirty years for the gasholder at Hollinwood, £51,600; the boundary wall, £4600; additional gasholder storage, £33,000; and the distributing mains, £25,000.

The CHAIRMAN said the Committee were prepared to give the thirty years for the £51,600, the £4600, the £33,000, and the £25,000 for mains. With regard to the £30,000 and the £5000 for stoves and meters, ten years would be given. They were willing to give twenty years for the remainder of the items, which came to £49,000. The clause in the committed Bill in which the amounts would be mentioned in these terms would have to be amended.

Finance and other parts of the Bill were next dealt with.

A successful gas exhibition, promoted by the Great Grimsby Gas Company, was recently held in the King's Hall in the town. There was an excellent show of cookers, fires, &c.; while up-to-date gas lighting was demonstrated by means of an installation of Keith high-pressure inverted lamps. A series of practical cookery lectures by Mrs. Springthorpe added to the interest of the show. The exhibition was opened by Mr. William Bennett, J.P. (the Chairman of the Great Grimsby Gas Company); and in proposing a vote of thanks to him for performing the recemony, Mr. David Smith (the Chairman of the Cleethorpes Gas Company) said he thought the Directors and the Engineer (Mr. John Terrace) were to be congratulated on the excellent display.

LEGAL INTELLIGENCE.

Charge for Coal-Trucks Left on Sidings.

In the King's Bench Division last Wednesday, Mr. Justice Channell and a Special Jury had before them a case in which the Midland Railway Company sought to recover from Messrs. Myers, Rose, and Co. certain sums arising out of a notice they had issued to the effect that after Aug. 1, 1905, they would charge 6d. per day per truck for coal-waggons kept on their "wait-order" sidings for more than three days after the day of arrival, waiting instructions from coal-factors as to their ultimate destination. It had been held by the House of Lords, in an appeal arising out of the same case, that the plaintiffs were limited to making a "reasonable" charge; and this therefore was the point which the Jury had to decide. The Railway Company admitted that the sidings were a convenience to themselves; but they urged that they were also a convenience to their customers, and constituted a service which the Company were under no obligation to render. The charge, it was stated, was necessary because in a number of cases the sidings had become congested through factors allowing their trucks to remain on them. The Jury found that a charge of 6d. per day per truck, after three clear days, was reasonable; and judgment was therefore entered for the Midland Railway Company.

Mantle and Burner Frauds at St. Helens.

Last Saturday week, the St. Helens Magistrates had before them George G. Wake and Frank Owens, of Liverpool, and described as travellers, who had been remanded on four charges of having obtained money by false pretences. Wake pleaded "Guilty," and Owens "Not guilty." The Chief Constable said prisoners represented that they were representatives of the British Economic Gaslight Company, of No. 12, Tabor Street, Seacombe, which only existed on paper; that they were selling a new patent burner of English make, which happened to be of German manufacture; that the burner would reduce the amount of gas used by seven-eighths of the usual quantity; and that the mantles were unbreakable, and would last at least five years. The charges against them had been selected from a large number of cases which had been brought to light. The system the prisoners had adopted was similar to that of the shoddy clothing dealers and flash jewellers. They had issued circulars which set forth the advantages claimed for their supposed invention. With the aid of a very plausible tongue, they succeeded in convincing people of the advantages they claimed for the mantle, and then charged an exorbitant price for the outfit. It could be bought on the market for 1s. 6d.; and they sold it for 8s. 6d. A receipt-book in Wake's possession showed that he had made £10 5s. since April 18; and prisoner had admitted that, "if he put his shoulder to the wheel," he could make £15 a week. Hyman Bieber, Manager for Messrs. Dazieger and Co., gas-mantle dealers, of Liverpool, spoke to having supplied Wake with burners and mantles for three months. For the former, he paid 1s. 6d. for each outfit; and he bought mantles at 1s. 6d. and 2s. 6d. per dozen. The mantles were made in Germany. Wake gave him a cheque for £1 4s., but it was dishonoured; and prisoner had not yet settled up as he promised to do. Wake said Owens had nothing to do with his (Wake's) business, and received no advantage or benefits from it. He had simply carried a bag and distributed circulars. Wake was sentenced to six months' imprisonment, and Owens was placed under the probationer's officer for three years. The Bench censured the witness Bieber for the way he conducted his business; the Clerk adding that he was almost as bad as a receiver in a larceny case.

Charge of Stealing Gas Dismissed.

At the Witney Petty Sessions, last Thursday, Henry W. Smith, a printer, was summoned by the Witney Gas Company for stealing (by disconnecting the inlet and outlet pipes of the meter and coupling them together, so that the gas was consumed without passing through the meter) a quantity of gas between Jan. 1 and March 9 last. Walter Mason, a fitter in the employ of the Company, stated that defendant had resided at No. 55a, High Street, for about three years, up till March. Witness fitted a penny-in-the-slot gas-meter in defendant's house, and called each quarter to collect the money. He also kept account in a book of the various amounts received from defendant. In 1908, the figures were: March, 3s. 3d.; June, 2s. 2d.; September, 5s. 2d.; and December, 3s. 7d. From Dec. 31 to March 7, 1909, the day he left the house, 6d. only was in the meter. On March 10, witness called at the house and examined the meter, and found the inlet and outlet pipes were twisted, and the leather washers were gone. On March 23, witness went to defendant's house in the Woodstock Road. Acting under instructions, he tightened up the unions of the meter there. On April 17, he again called at the house. Mrs. Smith opened the door, but refused witness admission. Later he again went to the house with Mr. Arthur Leigh, the Managing-Director of the Company, and was again refused admission. Subsequently, on a third call, they were admitted, and found the unions loose. He opened the box in the meter, and found only 2d., although 24 days had elapsed. Mr. Leigh corroborated this evidence. Defendant denied having touched either of the meters. The Magistrates said they were of opinion that the case was a suspicious one; but as there was not sufficient evidence to convict, it would be dismissed.

Messrs. A. Roux and Co., of Temple Bar House, E.C., and of Montbéliard, Doubs, France, manufacturers of gas-meter indices and accessories, inform us that they have converted the English part of their business into a limited liability company, under the style of A. Roux and Co., Limited, with registered offices at No. 9, Southampton Street, Holborn. They are now opening works at No. 140, Finch Road, Handsworth, Birmingham, in order to manufacture the articles indicated above, by means of modern machinery, from British material and with British labour.

MISCELLANEOUS NEWS.

THE QUESTION OF SALARIES AT BIRMINGHAM.

Gas Committee's Proposal Not Agreed To.

At a Meeting of the Birmingham City Council last Tuesday, under the chairmanship of the Lord Mayor (Alderman G. H. Kenrick), the report of the Gas Committee for the past year, together with certain recommendations of the Committee regarding the fixing of salaries, &c., was submitted. The report and the recommendations were noticed fully in the "Journal" for the 4th inst. (p. 320).

Alderman Sir Hallewell Rogers, the Chairman of the Gas Committee, in presenting the report, first moved—"That the Committee be authorized in special cases to make special terms for the supply of gas, the charge to be such as will be applicable to all consumers whose conditions of supply are similar; such terms to be submitted to and approved by a Joint Committee of the Gas and Electric Supply Committees."

After a short discussion this was carried.

Alderman Sir Hallewell Rogers then proposed—"That the maximum salary to be paid to each of the Engineers-in-Charge at the Saltley, Nechells, and Windsor Street works be fixed at £1000 per annum, and that the Committee be authorized from time to time to advance such salaries up to such maximum figure."

Mr. David Davis rose to a point of order. He contended that, if the resolution were passed, it would be directly in conflict with the first of the general instructions to committees, which required the Committees to report to the Council any proposal to increase salaries to their officials by £50 or more. The resolution moved by Sir Hallewell Rogers fixed a certain figure which might or might not be reached; but the Committee by the resolution were endeavouring to take power to increase the salaries of certain persons when they thought fit to do so. If they did this, they would be in conflict with the first general instruction to committees.

The Lord Mayor said the Committee were asking for authority to advance salaries from time to time up to a maximum figure. They did not say they should do it without coming to the Council; all they asked was that the Council should fix the maximum—the idea being that advances would be made from time to time.

Mr. Davis: With the consent of the Council?

The Lord Mayor: It does not say with the consent of the Council. If you raise the point when it comes up, you will be in order.

Mr. Davis said it would be too late to raise a point of order when the Committee had already done it. The resolution gave power to the Committee to raise the salaries without coming to the Council again; and he submitted this was in conflict with the general instruction. If the Committee wanted the power, they must put an end, first of all, to the general instruction.

The Lord Mayor, after further discussion, said there was an essential difference between a standing order and an instruction to a Committee. This was the Town Clerk's view. It seemed to him that the resolution was strictly in order.

Alderman Sir Hallewell Rogers, speaking in support of the resolution, said that many points he should have to deal with applied to the next resolution, which referred to the salary of Mr. Barber. He did not minimize the importance of the resolution. They were associated with a scheme which the Committee were bringing forward respecting the future management of what was the largest Corporation undertaking in the city, and the largest business of any kind within the city. They contained, as Mr. Davis had said, to some extent a new principle—at all events as far as the present practice of the Council was concerned—for they fixed the maximum salaries of four important officers of the department, and gave the Committee discretion to raise the salaries from time to time, within the maximum named, without the sanction of the Council. At the same time, he submitted the resolutions with the greatest confidence. They would appeal to business men in the Council; and they had the support of every member of the Gas Committee. An increase in the salaries paid to the officers of a trading department did not necessarily mean an increased charge on the rates; and it would not be so in this instance. If the best possible men were obtained for the management of a corporation business, and they were paid proper salaries, they made, as a rule, larger profits; and this meant a decrease, and not an increase, in the rates. If the ratepayers wished to receive, as they were receiving, large cash contributions from the Gas Department, they must support the Gas Committee in their endeavour to obtain and retain the best possible officials for the working of the department. It was necessary to attract thoroughly reliable officers for the chief positions; and in order to retain their services, a maximum salary must be decided upon, so that they might be able to look forward to an increase without debate in the Council every time a proposal was made to give them an advance of £50. The Gas Committee were empowered to purchase and sell materials having a value of not less than £600,000 in any one year; and surely they could be entrusted within the maximum to advance the salaries of their officers from time to time at their discretion. In neither of the resolutions was it proposed to advance the salaries to the maximum at the present time, nor, indeed, for some time. The policy of the department should be to preserve intact an organization which was working with such excellent results to the ratepayers and the consumers. Sir Hallewell spoke of the admirable business qualities of the Engineers, and reminded the Council that these officers, together with the Chief Chemist and the Secretary of the department, formed an Advisory Committee, whose work during the last twelve months had been invaluable. The department had a capital of nearly three millions, and an income of nearly one million. It was the largest gas undertaking outside London. At one time they had a monopoly for the supply of artificial light for heating and motive power; but this was not the case now, for they had to compete with suction gas and electricity. This rendered it necessary that the department should be kept on a thoroughly business footing,

so that it might continue to be profit-earning for the ratepayers. The new scheme promoted by the Committee was less costly than the old one; it was more efficient, and more advantageous in every way. The salaries included in the two resolutions were in the aggregate less than were paid ten years ago, although the output of gas had increased 25 per cent. The undertaking had constantly been making records by reducing the price of gas and by increasing the contributions to the rates. He, therefore, asked the Council to accept the recommendations of the Committee. By doing so, they would retain the services and encourage the men who were now the responsible heads of departments, and in the future they would always attract the best men to serve under the Corporation.

The resolution having been seconded,

Mr. WALTHALL opposed the fixing of the maximum, although he was in favour of the increase to the Gas Engineers.

Mr. BROOKS said that Sir Hallewell Rogers had made it clear that the intention of the Committee was to ask the Council to fix the maximum up to which limit they might advance the salaries without consulting the Council. The Committee were asking the Council to depart from a long-established practice; and if such a precedent were approved that day, then every other Committee might ask that maximum salaries should be fixed for their officials. The Council ought not to give the Gas Committee authority which they would not be prepared to give to other Committees. The present system with regard to increases of salary was very unsatisfactory. It was not in the best interests of the ratepayers every time a Committee wished to increase a salary by £50 or more that they should have to ask the Council's consent. He thought discussions in public on such matters should be avoided as far as possible, and that some means should be devised whereby the salaries of officials might be considered by a specially-appointed committee. He therefore moved, as an amendment, "That the General Purposes Committee be requested to consider the desirability of revising or altering the present system of dealing with increases of salaries to Corporation officers and servants, and to report their recommendations; and that in the meantime the further consideration of the proposed increases of salaries as set out in the Gas Committee's report be deferred."

Mr. E. MARTINEAU seconded the amendment.

Mr. STEPHENSON said it would be very unwise to give all Committees a free hand in the matter of advancing salaries.

Alderman Sir JAMES SMITH could not conceive that any Committee, however constituted, would be able to judge of the value of the services of officials so well as the Committee under whom they worked. Each case had to be considered on its own merits. If the concession the Gas Committee asked for were granted, then it did not follow that other Committees would ask for the same thing. The business of the Gas Committee was run on lines somewhat different from that of other Committees. The Gas Department was a purely commercial undertaking conducted on very keen business lines; and he regarded it as he would the affairs of a successful company in which he was a shareholder. If the chairman of a board of directors brought up a report showing a successful year, good dividends, and the provision of ample reserves, he would be satisfied to allow the directors a very liberal margin for the internal arrangements of the business. The Committee were so much trusted, and were doing so well, that the Council should give them perhaps larger powers than were given to other Committees. He, however, asked Sir Hallewell Rogers to say in what length of time the Engineers should be entitled to the proposed maximum salary.

Alderman HUNT urged that the principle contained in the resolution was a new one, and had been sprung upon the Council somewhat suddenly. He did not think it fair to ask the Council to reverse what they had been doing for years. Moreover, if the principle were granted to the Gas Committee, the Tramways Committee and the Electric Lighting Committee should be allowed to fix the maximum salaries of their managers at £2000. He urged that the Council should always be in the position to say how far the Committee might go in the way of salaries.

Mr. J. S. NETTLEFOLD, who appealed to the Council to consider an important business question in a business way, said that men who wanted to make a living were only too pleased to give a little bit of a large profit to those who made it for them. The Council were presented with a large profit; and he was somewhat astonished to find an atmosphere of criticism. He contended that the resolution protected the Council in fixing a maximum. He added that he did not see why the power of increasing salaries to fixed maxima should not be given to every other Committee besides the Gas Committee.

Alderman the Right Hon. WILLIAM KENRICK, who supported the resolution, said that, when the city acquired the gas undertaking, Mr. Chamberlain warned the Council that they must not treat the Gas Committee like one of the ordinary Committees of the Corporation, but must give them greater freedom, and repose in them greater confidence, or the gas enterprise could not possibly be managed. The Council, as a rule, had been very generous to the Committee, and had trusted them; but there had been occasions when small questions of salary occupied members a whole afternoon, though often matters of hundreds and thousands of pounds slipped through without any question whatever. It showed that for business matters they must have a business committee, who could come to a decision on the merits of a subject without the fear of their arguments appearing in the Daily Press. These were matters on which the ordinary ratepayer neither had nor could have any opinion. The system on which the Council acted in regard to salaries was a bad one; for they started with a small salary, and did not in consequence get the best man. Then, by the automatic principle, they increased his salary until he reached the point at which he was not worth the remuneration. The better method was to fix a maximum, as the Government did; for a man then knew what he had to expect if he did his duty well. But there was no man who would not shudder at the thought that, after he had done his best, the question of an increase of his salary by £50 would have to be discussed in the Council. They would not get the best men on these terms. If they could not trust the Gas Committee and be generous to their officers, let them give up trading and confine themselves to sewers, health, public lighting, and matters of that kind, in which they could not do a great deal of harm, and certainly would not make a great loss. He had faith in the Gas Committee; and he thought that their proposal was quite reasonable and moderate.

Mr. FREEMAN, who thought that Alderman Kenrick and Mr. Nettlefold had obscured the issue, said the Council had to decide whether they should give the Gas Committee a power which had not been entrusted to any Committee up to the present. If the Council now fixed the maxima the Gas Committee could, if they liked, raised the salary of each of the Engineers to £1000, and that of Mr. Hampton Barber to £2000, in one year without having again to consult the Council. He hoped Mr. Brooks would withdraw his motion.

Mr. DAVIS submitted that the resolution was not a proper one, and ought never to have been brought before the Council. The first of the general instructions to Committees, which, he took it, were laid down seriously, and were to be obeyed, required them to recommend to the Council for appointment any officers who might be required in their respective departments, and the salaries of such officers, and "to report to the Council any proposal for the increase of the salaries of such officers, when such proposed increase amounts to £50 and upwards."

The LORD MAYOR said Mr. Davis's quotation was a condensation of the actual minute which was passed in 1889. The minute stated "that it be an instruction to all such Committees as have been in the habit of increasing salaries of officials in their employment without obtaining the sanction of the Council, that they shall henceforward report to the Council any proposal for the increase of the salaries of such officers when such proposed increase shall amount to £50 and upwards." He called attention to the words "without obtaining the sanction of the Council," and contended that the Gas Committee were not endeavouring to obtain the Council's sanction to increases.

Mr. DAVIS said he disagreed with his Lordship. The Committee were not asking for the increase of anybody's salary; but they were asking that a maximum should be fixed. At present there was no proposition before the Council for the increase of any individual's salary. If the general instructions meant anything at all, they were instructions to every Committee of the Council; but the Gas Committee asked for power to increase the salaries of the Gas Engineers and Gas Manager to any extent so long as they came within the proposed maxima. He submitted that the resolution ought to be divided into two parts. The first, which dealt with the fixing of the Gas Engineers' salaries at a maximum of £1000 a year, the Committee need not trouble about, because they could fix their maximum at any time they liked. But the second part gave them power to increase the salaries from time to time; and he would utterly oppose this so long as the "general instructions" remained on the books. He therefore proposed, as an amendment to the motion, that all the words following "£1000 per annum" be omitted from the resolution. This would give the Committee power to fix the maximum salary, but would not give them authority to advance to the maximum without first bringing the matter before the Council.

Mr. JEPHCOTT seconded the amendment.

Alderman J. H. LLOYD said there were at least two Committees who had the power to fix salaries; and it had always seemed to him an anomaly that this power was denied to the large Trading Committees of the Council. He quoted the General Standing Orders to show that all the powers of the Council in regard to the gas undertaking were conferred upon the Gas Committee, with the exception of the issue of annuities, and went on to say that the Committee thought that, instead of haggling continually over increases of salary, the Council would have been glad to accept the proposal submitted to them. He reminded the Council that a year ago Sir Hallewell Rogers told them that a scheme of the kind now proposed would be brought forward in twelve months.

Alderman CLAYTON said that in the early days of the Council, on the appointment of the Gas and Water Committees, there was an absolute delegation to them of all the powers of the Council except as to borrowing money, with the addition of the words "reporting to the Council from time to time thereon." But they did not report; and that was how the trouble came. It came out that while other Committees had to bring their proposals before the Council, the Gas and Water Committees had been giving increases on the quiet. Accordingly, in 1888, they were instructed to report on the salaries they had been giving for the past year. In the report there appeared a whole page of increases which had not been reported to the Council. At that time there was so much feeling in the Council about the matter that the restriction about £50 was imposed on every Committee. In addition to the Committees mentioned by Alderman Lloyd, the Education Committee was freed from the stipulation—though the instruction to the Education Committee, if read carefully, read both ways. He should support the recommendation of the Committee.

Mr. MURRAY remarked that anyone who knew anything about a business like the gas undertaking knew that those whom they employed rendered themselves liable by their ability to be approached by other authorities. It had been their bitter experience to lose valuable men in this way. The knowledge that there was a maximum fixed, to which they had a right to look forward played an important part in the consideration of offers made to their employees from outside authorities.

Alderman TONKS said two questions had been introduced, and had caused the difficulty. He thought it would be unfair to refuse the salaries by a vote which, he considered, would be taken under a misunderstanding; on the other hand, he felt sure many of them were of the opinion that a resolution so far-reaching in its effect should not be voted on through a side-issue. This would be contrary to the wise conduct of public business.

Mr. TOLLER pointed out that twelve months ago the Chairman of the Gas Committee said a new system was to be given a trial. All the Committee now asked was for powers to carry out the principle, as it had been found to work satisfactorily. They had in their employ some of the best engineers in the country; but they would not remain unless some inducement were offered them.

The LORD MAYOR said this was an important question of principle. Alderman Clayton had called attention to the fact that on the construction of the Education Committee one of the first things they did was to apply to be freed from the restriction referred to, because they felt the necessity of being able to increase salaries in a different way. The Council very generously removed the restriction. The first thing

the Committee did was to fix the maximum salary of their Secretary, and, as far as possible, they fixed the maximum of salaries all through. The object of mentioning the most they were prepared to give when applying to the public was so obvious that he wondered it had not occurred to other people on the Council before. As to Mr. Brooks's amendment, he suggested the matter was already before the Council. He was glad the Gas Committee had had the courage to bring it forward, thereby intimating to other Committees that they should do the same if they thought proper. He should vote for the adoption of the recommendation.

Alderman Sir HALLEWELL ROGERS said he did not think it would be well to accept either amendment. He was convinced they would not be able to retain the services of their Engineers unless they gave them something to look forward to. He was equally convinced that £1000 was a fair average to fix the maximum at. He pointed out that during the past twelve months they had got 287 cubic feet more out of every ton of coal carbonized. This meant a saving of 15,500 tons of coal, and no less than 165 million cubic feet of gas. This had been done under the new scheme. Putting it at the lowest, it meant £7000. The position was due in great measure to the Engineers mentioned.

The amendments were then put and lost; and the original resolution was also lost.

Alderman Sir HALLEWELL ROGERS then said the recommendation as to the appointment of the Secretary, which was part of the general scheme, would be withdrawn. The matter would have to be again considered by the Committee.

The Annual Accounts.

Alderman Sir HALLEWELL ROGERS, moving the adoption of the report of the Gas Committee, referring to the accounts, said their profits for the year under review had been affected by two important factors. They experienced a period of bad trade and bad weather. As a consequence, their business had been adversely affected. It was, therefore exceedingly satisfactory to note that there was an increased credit balance to contribute to the rates this year. Their income for the past year was £935,636, or £44,000 less than the previous year. The quantity of gas sold was 7000 million cubic feet, or 6¼ millions less than in 1908. The price was reduced in October last; and had it not been for this, the income would have been £28,000 more than at present. The residual products—coke and breeze—realized £142,000, against £149,000. This was due to the fact that they carbonized 1550 tons of coal less than in the previous year. The cost of coal was £28,000 less. This was due to the fact that they got 287 cubic feet more gas out of every ton, and also that they had purchased at a cheaper price than in 1908. The amount paid in wages was less. This was not because the men had been receiving less, but because the amount of coal carbonized was less than last year. The amount to be contributed to the rates was £71,459, or £10,146 more than the previous year.

Mr. COOKE asked what the effect of the installation of a Fiddes-Aldridge machine would be on the Council's employees.

Mr. ARTER asked if the time had not now arrived when the consumers might reap a direct advantage from the profits of the undertaking.

Alderman Sir HALLEWELL ROGERS, in closing the discussion, said he could not say what would be the number of men employed when the Fiddes-Aldridge machine was fixed. Employment, however, had been found for all the men thrown out of work by the reconstruction of the retort-house. With regard to Mr. Arter's question, he pointed out that their prices for gas compared favourably with other towns; but he agreed that, in view of the amount contributed to the rates, the next person to be considered was the consumer.

The report was approved.

THE DEPLETING OF RESERVES.

Manchester "Economies" at the Expense of Trading Departments—Mortgaging the Future.

By the admitted "squeezing" of the trading departments, coupled with enforced retrenchment on the part of the spending Committees, the increased rate for Manchester has been reduced from a possible 8d. in the pound to 3½d. It will be remembered that, under pressure, the Gas Committee agreed to advance their contribution to the City Fund from £26,495 to £50,000; but this has only been done by the depletion of the department's reserves.

At a special meeting of the City Council last Wednesday, when the estimates were approved, Alderman Copeland, Chairman of the Finance Committee, referring to the trading departments, expressed the opinion that the promised contributions in aid of rates were made without injuring the soundness of their financial positions; but this was challenged by Mr. Billam, who characterized the Finance Committee's policy as "economic madness." The reduction of the probable advance in the rates had only been reached, he pointed out, by the depletion of reserve funds, by retrenchment on renewals, and by the mortgaging of prospective profits. It was Mr. Billam's conviction that the Finance Committee had placed an embargo on the trading Committees that would paralyze them; and cheapness had been secured at the cost of efficiency. Economies of the type now being effected might land the Council in a greater muddle than they were designed to mend. There was no getting away from the fact, he added, that the Gas Committee had absorbed the whole of their reserve fund.

In contributing to the discussion, the Lord Mayor (Alderman Holt) held that no trading Committee had been asked to contribute more than they could afford. He said there were reasons why the Gas Committee had increased their grant—and very substantial reasons, too. In this connection, he pointed out that the trading Committees of the Corporation were liable to the same vicissitudes as all other trading concerns in the city. The Tramways, the Electricity, and the Gas Departments had all felt the effect of the decline in trade. It was true that in one case the Committee had had to dip into their reserves; but this was what was done by most companies in bad times. What was more, in this particular case there were substantial reserves. It was his desire to correct an erroneous impression which had got abroad that they had been "Robbing Peter to pay Paul." In no instance had saving been effected by the stopping of work that ought to go forward.

Dealing with the general question in a special article, "The Ratepayer," the organ of the Manchester Ratepayers' Association, published yesterday, says: "What is the cold truth? The printed estimates just issued along with the report of the Finance Committee, show that the entire difference between an advance of 3½d. and 6½d. is made up by the mortgage and depletion of the reserve funds and renewals accounts, on the strength of purely hypothetical profits to be made during the current year. The reserve fund of the Gas Committee, which four years ago stood at £147,608, is now completely gone; and the depreciation on renewals account is mortgaged to the extent of £23,000, so that this amount may be contributed in aid of rates. The sum of £15,000 has been obtained from the Tramways Committee by robbing the renewals account of this amount for the same purpose. Yet only last year the professional Auditors of the Corporation commented in their report on the fact that no provision was contained in this account for depreciation on buildings. A fund that was deemed inadequate before, has actually been further reduced to make a fictitious balance to be given in aid of rates! These two sums of £23,000 and £15,000 are more than enough to account for 3d. 'saved' in the rates. It was against this kind of so-called economy, as opposed to the real thing, that the resolutions passed at the citizens' meeting were directed."

The Position in Salford.

Faced with a possible advance in the rates by 1s. 1d. in the pound, the Finance Committee of the Salford Town Council have insisted on a revision of the estimates of the different departments, with the result that considerable reductions have been made. The Council will be recommended to advance the borough municipal rate by 6d. in the pound, bringing the levy for municipal purposes from 6s. 6d. to 7s. To this has to be added an increase of 4d. in the pound in the poor rate, bringing the total increase up to 10d. Since 1899, the rates have advanced from 6s. 7d. to 8s. in the pound. During the past year, there has been a falling off in the receipts of the trading departments of the Corporation. For instance, the Gas Committee's takings are £5000 less than was estimated, the water-works department £1250 less, and the tramways £2000 less.

GAS PROFITS AT ST. HELENS.

At the Meeting of the St. Helens Gas Committee last Wednesday the results of the past year's operations at the gas-works were submitted. The statement showed that, after providing for interest, sinking fund, and other charges, the net profits for the year amount to slightly over £9100. Out of this sum, the Committee decided to vote £5000 to the borough fund to be used as the Finance Committee may direct—that is, in relief of the rates. This is the fourth year in succession that this sum has been voted by the Gas Committee; and altogether £81,030 has thus been voted to the relief of the rates. In view of the depressed state of trade in the town, which has influenced the gas-works as well as every other manufacturing concern, the result was considered very satisfactory by the Committee who have charge of the department, especially considering the fact that during the last working year, after the new assessment of the gas estate had been made, the rateable value was considerably increased, which has raised the amount to be paid in rates by about £1500. Though the net profits are rather less than last year, taking this into consideration the results are really better. It is stated that the output of gas shows a small increase.

The "St. Helens Newspaper and Advertiser," in referring to the matter, says: "As we have pointed out in previous years, much of the success of the gas-works in St. Helens is due to the exceptional advantage which is taken of the opportunity of working up and marketing bye-products, which cover quite a wide range of commodities, and which have been found a source of considerable profit. Experiments have also been made in a new method of carbonizing the coal which is quite expected to lead to the realization of better results from any quality of coal used. One of the special features of the work at the St. Helens Gas-Works is the utilization of the cheapest forms of gas coals of the neighbourhood, which, being much more economical to buy, enable the Committee to realize such handsome profits, owing to the skilful way in which the materials are treated. The latest idea is one that we understand the Gas Engineer has been studying for many years—the question of using vertical instead of the usual horizontal retorts. This is a very important question, if the output at the present gas-works is to be increased to meet the ever-increasing demand, as if these retorts could not be used it would be necessary to at once erect new works on the site at Pocket Nook, at a very large capital outlay. This system is being tested in every possible way, and so far with very good results. In making these comments, it is well to remember, as will be seen from the monthly record of their work in the minutes of the Gas Committee, that steady progress has been made in improving the lighting of the borough. Incandescent lighting is gradually taking the place of the old method, to the great satisfaction of the townspeople. Then it may also be pointed out that gas consumers in St. Helens have several very exceptional advantages which are not enjoyed in most other towns—no charge being made for the use of cooking and heating stoves, which are now so generally employed. The Gas Committee, with a Chairman so full of enthusiasm as Mr. Crooks, and such an able Engineer as Mr. S. Glover, have evidently been animated with a desire to serve the public interest in the best manner possible; and they are once more to be congratulated on the results of a very successful year's work.

Lighting Lamps by Wireless Current.—According to the "Evening Standard," a telegram from Omaha (Nebraska) reports that 4000 incandescent lamps in the local exhibition there were lighted last Thursday night by a wireless current from a station 6 miles distant. This is stated to be the first public test of a lighting current sent without wires. Pending the grant of a patent, details are withheld.

WELSBACH INCANDESCENT GASLIGHT COMPANY.

The Effects of Depressed Trade and Competition.

There was a good attendance of shareholders at the meeting of the Welsbach Company yesterday, at Winchester House, to hear the statement of the Right Hon. Lord Weardale (the Chairman) on the working of the past year. Though there was no recommendation as to dividend for the ordinary shareholders, the meeting was harmonious, and entirely sympathetic with the Board.

In submitting the report and accounts, which were noticed last week (p. 404), the Chairman reminded shareholders that, when he addressed them a year ago, he mentioned that, as a Board, they would be disappointed if the results of the year's working now under review proved less favourable than the figures then under consideration, and also that probably only one thing would interfere with their calculations, and that was increased cost of raw material. They had certainly had to face unexpected increases in one or two important lines of raw material; but it was not this increase that had substantially influenced the trading figures now submitted. When they met a year ago, it was not possible to foresee the wave of depression that overtook not merely their business, but, he supposed, the business of practically every industrial company not only in this country but all over the world. It was true that they had contracts upon which, in his speech last year, he perhaps too confidently relied, and which practically assured to them an increased trade. But when the time came for the Company to enforce these contracts, they dared not do so. To have forced upon customers who had stood by them for twenty years goods that the state of the market prevented them selling, would have been suicidal on their part. Some of their largest customers told them frankly that they were in the Company's hands; and if the Directors forced the contracts upon them, they must take the goods and pay for them when and how they could. The situation in this respect was for some months exceedingly difficult; and he could assure the shareholders that the executive had passed through a most anxious and trying time in consequence. They were for some months, in what should have been the busiest part of the season in many of their important lines, merely marking time. He was glad, however, to say the difficult situation had improved; but it had left its mark on the figures of the year. In times of phenomenal bad trade, one suffered in many ways in business. In the first place, one's many competitors (who were almost all more or less short of money) were forced to sell their goods frequently below cost price so as to obtain cash. In the second place, it was a work of the greatest difficulty to collect outstanding accounts. In the third place, the public generally bought only the cheapest article, and the trade, knowing this, ordered accordingly. The Company had suffered from all these troubles; and though he was able to tell the shareholders that, in spite of everything, they had once more slightly increased their sales of mantles, he must also tell them that this business had been effected to the detriment of the better class of mantles, the sales of which showed a reduction. This, added to the fact that the cost of raw material had somewhat increased, accounted for the figures before the shareholders that day. He promised a year ago that he would exercise rigid supervision over any increase in working expenses; and he was now able to tell them that the Company's position in this respect was satisfactory, without any sacrifice of efficiency. With regard to the quality of the mantles, both Welsbach ramie and Plaissetty cotton, they had received gratifying reports throughout the year. So far as the Welsbach inverted ramie mantle was concerned, there was nothing equal to it on the market: and the constantly growing inverted mantle business was bound to be a great factor in the future situation.

The Chairman then directed attention to the lines upon which the accounts were now framed, and commented at length on what he described as the intangible and tangible assets of the Company. He then passed to the investment in the Austrian Company. Reverting to the commercial results of the half year, he said the balance of profit, after allowing for various trade charges, was £10,680 down. The decrease was not due to any increase of working expenses. On the contrary, they had been able to make fairly substantial savings. The drop was almost wholly due to the reduced trade and lower selling prices. Their great mantle business was in two divisions. It was divided between those—particularly gas companies and lighting authorities—who bought the best article, and relied upon its long life to repay them for their outlay, and those who used cheaper mantles, and renewed them constantly, relying upon the lower price to recoup them for the increased labour and greater number used. This latter class had materially increased during the year under review. There had been increased competition. Several of their large Continental competitors ran their factories full time from year's end to year's end; thus that ensuring the cheapest rate of production. They sold all the mantles that they could in their home markets; and the balance was available for England at any price they could get for them. [Voices: "Try tariff reform."] In addition to this, they had suffered from the competition of the metallic filament lamp. A large section of the public had been wrongly induced to believe that electricity was at last cheaper than gas, though the Company had over and over again challenged the misstatements. A great amount of mischief, however, had been done. Numerous propositions had been made to the Company to take up the manufacture of metallic filament lamps. Although the Board recognized it was their duty to examine these suggestions, nothing had so far been put before them to justify them making such a radical departure. He desired to say quite frankly that—while, having regard to the figure of good-will standing against the Company, the Board recognized the desirability of building up the reserve fund—they would have no hesitation in spending further money in advertising and propaganda work if the trade rendered it necessary. As a Board, they had had an anxious year; and the result was as good as was possible under the circumstances. Having regard to the deplorable showing made by some of the great industrial companies during the year, he did not consider the result was one of which they need be ashamed. The figures of the last six balance-sheets—from 1904 to 1909 inclusive—issued since the reorganization, showed that, in that period, assuming the recommendations of the Board were confirmed that day, £359,700 had been paid in dividends. The reserve fund had benefited to the extent of £110,000, and, in addition, the debenture debt of £110,000 had been paid off. He was pleased to say the Austrian Company had again declared a dividend of 20 per cent., so that the Company had received credit in the current year to the extent of £24,600. This represented the dividend on their holding in the Austrian Company, and would form part of the profits for the year ending March 31, 1910. The Austrian Company, like their own Company, had had a most difficult year; but nothing could exceed the devotion shown for the interests of the concern by the whole staff of the Austrian Company. The competition in all branches of the gas-lighting industry had never in Austria, as in England, been keener than during the past year. He must also acknowledge the activities of their own English staff. It was at periods of bad trade that the capacities and resources of the executive were subjected to the severest strain; and it would be idle to deny that the last twelve months had entailed exceptional anxieties upon those responsible for the conduct of the business. He was not only expressing his own individual opinion, but also that of the whole Board, when he said that their friend and colleague (Mr. L. Fletcher), whose knowledge of the mantle trade was unsurpassed, spared no pains, and spared no opportunity, for furthering the interests of the Company. In his arduous labours he had been efficiently aided by the whole staff.

Seconded by Mr. W. W. Wright, F.C.A., the report and accounts were adopted, and a final dividend at the rate of 6 per cent. was declared. Prior to the passing of the motion, however, there was some discussion, in the course of which from several quarters the action of the Directors in not recommending a dividend on the ordinary shares on this occasion was endorsed—it being recognized that the conditions of the year's trading, through the depression existing all round, had been abnormal. Certain shareholders also expressed the view that taxation on imported goods was what was wanted to improve not only the position of the Company but of other industrial home concerns.

The essential points raised in the discussion were dealt with by the Chairman; and, after formal business had been transacted, there was acknowledgment of the services of the Chairman and Directors and staff. To this the Managing Director (Mr. Fletcher) briefly responded.

THE MAIN-LAYING DISPUTE AT TAUNTON.

An Amicable Settlement.

At the Monthly Meeting of the Taunton Town Council last Tuesday, the question of the dispute with the Taunton Gas Company as to the laying of a new main in the roads of the northern part of the town, as reported in the "JOURNAL" last week (p. 399), again came up for discussion. A special meeting of the Council had been called the previous week to consider the subject; and the Town Clerk now read a supplemental report of the Main Drainage Committee, which stated that the Gas Company had undertaken to divert their main where it was laid in Kingston and Station Roads without the approval and contrary to the protests of the Council and their Surveyor. The Town Clerk presented the correspondence which had taken place between the Company's Solicitor and himself since the special meeting of the Council, from which it was seen that a week had been given to the Company before commencing the removal of the main from its present position, with a view to giving them an opportunity of submitting to the Council (for approval by the Borough Surveyor) a plan showing the proposed altered position of the main.

Alderman H. J. Spiller, the Chairman of the Main Drainage Committee, in moving the adoption of the report as now presented, said he was sure they would all be pleased that they had come to an amicable arrangement with the Company. The Council did not want any unpleasantness; and he hoped in the future that they would get on in a friendly way with the Company. Alderman A. J. Spiller seconded the adoption of the report, which was unanimously carried.

This will mean that what has been a little unpleasant incident will now be settled to the satisfaction of both parties.

Nottingham Gas Profits.—When the Nottingham City Council were considering the question of the rate to be imposed for the current year, it was stated by Mr. Ball that last year the Gas Committee gave £30,000 towards the rates; and this year they would be able to contribute £31,000. During the past year, the Committee had been careful in the buying of their coal; and had saved more than the £1000 he had mentioned.

Monte Video Gas Company, Limited.—In the report which they will present at the meeting next Thursday, the Directors state that the profit on the working for the year to Dec. 31 last, as shown by the revenue account, is £34,500. Adding interest and discount £1326, profit on exchange £481, Directors' fees waived £280, and the balance brought forward £11,311, the total is £47,898. After providing for interest on debenture stock, income-tax, bad and doubtful debts, and depreciation, reserving £4000 for renewals, &c., and adding £4000 to reserve account and £2000 to contingency account, the balance remaining at the credit of profit and loss available for dividend is £30,897. An interim dividend was paid, in respect of the half year to June 30, of 6s. per share, less income-tax; and the Board now recommend the payment of a further amount of 8s. per share, less income-tax, making together a dividend of 3½ per cent. for the year. This will absorb £18,967, and leave a balance of £11,930 to be carried forward. The balance at the credit of the reserve account is increased to £32,000, the contingency account will stand at £20,923, and the insurance fund remains at £12,500. As foreshadowed in the report for 1907, the price of gas for lighting, cooking, and industrial purposes was substantially reduced on Aug. 1, 1908. As a result of this policy, the gas sales are the largest on record; and the number of meters fixed was considerably above any of the previous eleven years. The revenue account shows an increase in receipts; but owing to the higher cost of coal delivered at Monte Video, and to the larger quantity carbonized to meet the increased sales of gas, as well as to a strike of the boiler-makers in the Dock Department in September last, the net revenue was £177 less than in 1907.

BURTON CORPORATION GAS SUPPLY.

In moving the adoption of the report of the Gas and Electricity Committee at last week's meeting of the Burton-upon-Trent Town Council, Alderman Lowe, the Chairman, said the working of both undertakings during the past year had been satisfactory. In regard to the gas-works, there was evidence of great care having been exercised to secure the best results. For the first time in the history of the gas-works, over 10,000 cubic feet of gas had been sold per ton of coal carbonized. It must, however, be borne in mind that a much larger sum had been spent on enrichment. For a number of years, the Committee had had to face a steady decrease in the amount of gas sold; and it was so this year, to the extent of 1½ per cent. This arose notwithstanding the fact that there was an increase in the number of consumers by 328, which was another evidence that economy was being exercised owing to the state of trade. Their revenue from residuals was still satisfactory; and the total profit from the works was £8000, which was rather less than last year. It had, however, to be remembered that for three-quarters of the year they had been working with a reduced price of gas. A sum of £6000 had been paid to the relief of the rates, and £1500 had been added to the reserve fund and deterioration, the latter now standing at £34,000, which was only £7000 less than the actual outstanding debt on the undertaking. These figures showed that they had works of great and increasing value; and in these days of pessimism it was rather good to feel that they need have no anxiety as to the future. The last instalment on two loans—one of £20,000 and one of £3500—would soon be paid; and as a result of this, £1500 a year would be saved. The Council would be glad to know that they have made contracts for coal at a reduction of 9d. per ton, which meant a saving of about £1100.

The income of the Gas Department for the twelve months to March 31 was £57,183, and the expenditure £48,450—leaving a surplus of £8733. The make of gas per ton was 10,762 cubic feet, and the sale 10,052 feet; the unaccounted-for gas being 5·72 per cent. As from June 30 last, the price of gas to ordinary and prepayment consumers was reduced 3d. per 1000 cubic feet—the charges now ranging from 2s. 4d. per 1000 cubic feet for large consumers through ordinary meters (excluding those for gas used solely for motive power and other manufacturing purposes), to 3s. 4d. for prepayment supplies.

GOOD RESULTS AT BURSLEM.

The report for the year ending Dec. 31 last on the Burslem Corporation Gas-Works was presented by the Engineer and Manager (Mr. Edward Jones) to the Gas Committee on the 20th ult.; and Mr. T. Mitchell, the Chairman of the Committee, submitted it to the Council on Monday, the 10th inst.

The accounts showed a total expenditure of £21,285, made up as follows: Coals and expenses thereon, £10,807; wages carbonization, £1426; purification, £619; repairs to works and plant, £1396; repairs to mains and services, £376; meters and stoves (including repairs), £2265; public lighting, £778; rates, taxes, and insurance, £1935; inspectors, £302; salaries, £833; general establishment charges, £234; bad debts, £93; Wolstanton Gas Bill expenses, £216. The receipts amounted to £29,020. There was therefore a balance of gross profit of £7735; and of this sum £5414 was allocated to interest and sinking fund charges, leaving a net profit of £2321. The make of gas per ton of coal was 12,036 cubic feet; and the percentage unaccounted for was 9·3. There were 2412 ordinary meters in use, and 4835 slots; and the number of public lamps was 696. The quantity of gas made was 211,057,000 cubic feet; and the capital (£128,000) per million cubic feet sold amounted to £679. The following is the revised net schedule of charges: Ordinary consumers, 2s. per 1000 cubic feet. Motive power consumers, up to 20,000 cubic feet, 2s. per 1000 cubic feet; from 20,000 up to 100,000 cubic feet, 1s. 10d.; from 100,000 up to 250,000 cubic feet, 1s. 8d.; from 250,000 up to 500,000 cubic feet, 1s. 6d.; 500,000 to 1,000,000 cubic feet, 1s. 4d.; from 1,000,000 up to 1,500,000 cubic feet, 1s. 2d.; 1,500,000 cubic feet and upwards, 1s.

Mr. Mitchell said the results were again very gratifying, there being a net profit of £2321 on the year's working, notwithstanding the reduction of 6d. per 1000 cubic feet charged for gas, and that the Wolstanton district was severed on March 4, so that only two months were included in the year's accounts. Coal was responsible for £885 increase; and unfortunately the residual market had in no way compensated for the extra cost. As a matter of fact, tar and coke alone showed a decrease of over £1200. Every endeavour had been made to popularize the use of coke in the district, with much success. A fair quantity was now used for oven-firing and gave the utmost satisfaction. The Committee were hopeful that coke would be more generally used for both industrial and domestic purposes. Tar, almost a drug, had fallen from 24s. to 16s. a ton. This was disappointing, as hopes had been entertained of a more general use of it in the matter of road making and maintenance. Owing to depression in the foreign markets, and increased home and foreign production, sulphate of ammonia prices had declined over £1 per ton. He mentioned this not so much to complain, as to show that the price of gas depended, not only on the price of coal, but upon the products obtained other than gas. During the past year, the carbonizing plant had been brought thoroughly up to date at a cost of £4222; and the whole of the gas was now produced on the inclined system. The make per ton of coal—12,036 cubic feet—was a very high figure; and excluding works having carburetted water-gas plant, there was, according to published analyses, only one other works in the country that surpassed Burslem. Unaccounted-for gas was an item which was always a source of anxiety to authorities supplying gas in mining districts; and Burslem was no exception. It was gratifying to be able to report a reduction of 2·71 per cent. for the past year as a reward for the vigilance exercised in the detection of leakages. Some 66 escapes on mains and services had been located and repaired during the year. They had already 4835 slot-meters in use; and during the last year the slot-installation system had been introduced—165 new consumers having been obtained by its means, most of whom had cookers and boiling burners fitted. Further development was to be expected in this direction. The recently revised scale of charges should induce and create new custom, and block the introduction of suction gas. Gas might now be economically employed for all purposes, industrial and domestic. It might be interesting to note that there were only six works in the country supplying gas to the ordinary consumer at a less rate than 2s. per 1000 cubic feet, and two only who supplied at less than 1s. per 1000 feet to power consumers. When they took into account the contribution of £1200 which the Committee had passed to the relief of rates, and also the reduction of 6d. per 1000 cubic feet, which amounted to over £4000 contribution to the consumers, they would see that the undertaking was very satisfactory. The Committee wished him to thank the Manager, Mr. Edward Jones, for the way he had helped the Committee and done his work. He also thanked every member of the staff.

Mr. Robinson, the Vice-Chairman of the Committee, in seconding the adoption of the report, referred to the ruinous competition that had been inaugurated by the Electric Light Committee, and said that if it did not stop, the ratepayers of Burslem would lose hundreds and thousands of pounds. He was sure the Council would appreciate the report the Gas Committee were presenting. When they had regard to the fact that they had an expenditure of £130,000, that 10 per cent. of their output had been taken away from them, and they had to provide for repayment of interest on the full amount, and that beyond all this they had a net profit of £2300, after supplying gas at 2s. per 1000 cubic feet, he thought the Council should congratulate themselves. He could see that in the future they were going to have a great demand for gas-firing of kilns and ovens. He would like to associate himself with all that the Chairman had said with regard to the Manager. He did not wish to see a better Manager than Mr. Jones.

The report was approved.

ROTHERHAM GAS-WORKS RESULTS.

Mr. J. S. Naylor, Engineer and Manager of the Rotherham Gas-Works, has issued his annual report, in which he says that the quantity of coal carbonized during the year ended March 31 was 24,302 tons, at a cost of £12,672, against 24,400 tons in the previous year, costing £12,474; being an decrease of 98 tons, at an increased cost of £198. The quantity of gas made was 300,014,000 cubic feet, against 295,958,000 feet; being an increase of 4,056,000 cubic feet. The make of gas per ton of coal carbonized was 12,345 cubic feet, against 12,130 feet; an increase of 215 cubic feet. This constituted a record yield per ton for the department. The quantity of gas sold was 269,587,000 cubic feet, against 267,698,000 feet; an increase of 1,889,000 cubic feet, which is very satisfactory, considering the state of local trade during the past year. The unaccounted-for gas was 26,419,700 cubic feet, or 8·81 per cent. of the make, against 24,611,200 cubic feet, and 8·31 per cent. of the make.

A sum of £400 has again been provided out of this year's profits to defray the expenses of the extra examination of mains and services, which largely contributes to keeping down the leakage. Owing to the reduction in the price of gas by 3d. per 1000 cubic feet, the revenue derived from gas sold is about £2200 less. During the year, the market for residuals has fallen considerably, with the result that the revenue from coke, tar, and liquor is £500 less than in the preceding year. The cost of public gas lighting, including wages and maintenance of the lamps, amounts to £4428, against £4518; and the number of lamps lighted was 1325, against 1310 last year. The cost of gas for public lighting amounts to £2413, against £2338. A sum of £2704 has been allowed for depreciation, against £2625. The amount of gross profit is £14,768, compared with £16,926; and the net profit, after allowing for interest, redemption, and sinking fund, amounts to £5395, against £7431. If the gas for public lighting (£2413) is again given by the department, as in former years, there remains an available surplus profit of £2981. Gas-mains have been extended to the parish of Dalton during the past year, where upwards of 400 consumers are now supplied.

The Auditor's report on the undertaking shows that the income from the sale of gas through ordinary meters was £1148 less than in the previous year; this being due to the reduced price of gas. The income from sales of gas through automatic meters had, however, increased by £826, as compared with 1907-8. The manufacturing charges per 1000 feet sold amounted to 1s. 6·19d., as compared with 1s. 5·73d. in the previous year; and the total cost per 1000 cubic feet sold was 2s. 6·44d., against 2s. 5·86d. in 1907-8. The average sale price was 2s. 9·08d., as compared with 2s. 9·72d. in the previous year.

Reduction in Price at Cockermouth.—At Wednesday's meeting of the Cockermouth Urban District Council, Mr. Fleming submitted the balance-sheet of the gas-works, which showed, he said, a profit on the year's working of £1166. After deducting £504 for interest on loans and £489 for debt repaid, the net balance of profit was £171. This increased the working balance from £2249 to £2421. After careful consideration, the Gas Committee recommended that as from March 31 the price of gas to ordinary consumers be reduced by 2d., making it 2s. 9d. per 1000 cubic feet, and that for slot-meters the quantity of gas be increased from 25 to 27 cubic feet per penny. The cost of the reductions would be £233. The expenditure for the year had been very heavy; and as the increases were mainly on items which could be fairly charged to capital account, it was evident that no part of the concern was being starved. Owing to the policy of not paying for extensions and improvements from additional loans, the total indebtedness was only £14,430, or about £543 per million cubic feet of gas made. Mr. Fleming concluded by paying a warm tribute to the far-seeing, capable, and skilful management of Mr. A. F. Young. The Chairman (Mr. Stephenson) said he thought the Council would be satisfied with the report. The gas-works were in a very good position. The report and recommendations were unanimously adopted.

BOMBAY GAS COMPANY, LIMITED.

A Gratifying Report.

The Ordinary Meeting of this Company was held last Thursday, at the London Offices, No. 6, Drapers' Gardens, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. A. Dickson, jun.) read the notice convening the meeting; and the Directors' report and the accounts (a notice of which appeared in the "JOURNAL," April 27, p. 247) were taken as read.

The CHAIRMAN said the shareholders would see that the Board were able to report a further considerable expansion in the sale of gas. Last year they had a very sudden jump in the sales, which was due to an increase in the public lighting, not so much from extra lamps having been put up, but from an alteration in the methods of the Municipality, who ceased to shut down the lighting on certain nights in each month. This gave them what he might term an adventitious increase. On the present occasion, they had not a similar set of circumstances to deal with; but there was nevertheless a most satisfactory increase to record—one which showed vitality, growth, and progress extending through the Company. There was an increase in the sale of gas for public lighting of something like 20 per cent., and in that for private consumers of about 7½ per cent. Seeing that when he first joined the Board nearly half the income came from public lighting alone, it was very satisfactory for him to be able to tell the shareholders that the private consumption was now double what it was ten years ago. There had been as many as 700 additional supplies put in during the past year. This would show them how energetic were the new Engineer and his staff. In the revenue account, there was an increase in the income from gas, from both sources, of £5113. There was a small increase in the rental of meters, including fittings, of £110; and there was also a very small increase in residuals of £274—because coal had been cheaper, and coke naturally followed it. Then as against this it would be remembered that last year they had a sum of £325 of recovered "bad debts" which had not been expected to be realized. This was not repeated on the present occasion; and therefore the total net increase, after allowing for this sum of £325, was £5169. It might be asked what had been done with this. Well, increased business meant a greater outlay for coals, &c.; and coal had cost them, because of the larger make of gas, £2229 more. Upon repairs, &c., the Directors had—and he thought the shareholders would say very wisely—incurred an additional expenditure of £2455. These two items—and the repairs were specially necessary for reasons which he would explain later—disposed of the bulk of the £5169. But they would not have these additional repairs again in the future. The Directors met the shareholders that day without the nasty cloud which was over their heads when he had to report the serious frauds that had been going on in the Company's service, not detected, as they ought to have been, by those whose duty it was to watch over and protect the interests of the Company on the spot. Extensive repairs were found to be needed by the gasholders, which, in that climate, were specially susceptible to rapid wear and tear; and the rapidity of the deterioration was increased when there was any negligence in the matter of the purity of the gas. At any rate, from whatever the cause, they had had to put practically the whole of the storage capacity in good order. This year they were completing the renewal of the second of the larger holders, besides having extensively repaired one; so that they would be starting again with holders in good condition. The result of this, he thought, would be seen in the reduction of the leakage, which, as they were aware, arose not only in the distribution system, but in connection with storage as well. The total distribution charges showed a decrease of £1317; but reductions under this head he never boasted much about, because the charges arose largely from repairs to mains, &c., on which he preferred to spend a considerable sum. He had spoken of the increase in the public lighting; and it was a matter of gratification to the Board to know that Bombay continued to be lighted by gas to the exclusion of electricity. Fortunately, the Municipality were not interested in electricity supply, in the way that was seen in this country—and which was shown up in Parliament only last week—where corporations levied rates upon the ratepayers, and upon the gas companies as large ratepayers, in order to make up losses which they were incurring in connection with electricity undertakings with which they were competing with the very gas companies who were among their largest ratepayers. Happily in Bombay they had a better informed Municipality. They appeared to follow closely what was going on in this country. When one saw what went on, it was clear that the question of the supremacy of lighting for large spaces in public streets had been definitely and absolutely settled in favour of gas. Even in a part of London with which he was very intimately acquainted, the whole of the area of one Gas Company was divided between two boroughs, each of which had an electric lighting undertaking. But so thorough and complete had been the conviction that had been driven home to the members of these Borough Councils of the superiority of gas, that they did not dare to extend the electric lighting in aid of their concerns. Only just lately, in the "JOURNAL OF GAS LIGHTING," they had seen it reported that a borough had decided not to put up electric standards in some roads that could be lighted by gas. The only argument that could be advanced in favour of electricity was that, as they had got a lot of capital involved in the electricity undertaking, they had better help it out of the rut as far as possible, by lighting the streets electrically, whether the system was better or not. But the ratepayers would not allow them to waste the rates by lighting the place in anything but the cheapest and most efficient fashion. He told the shareholders some years ago that Mr. Thompson, who was then Engineer of the Melbourne Gas-Works, when he came across to England, made, at a banquet of gas engineers, what was to himself (the Chairman) the very interesting and very remarkable statement, that Bombay was the best lighted city he had seen. In view of the fact that Mr. Thompson had just visited Vienna, Berlin, Paris, and London, this was a very high testimonial. He hoped the officers would strain every nerve to see that Bombay retained this position of supremacy. In the matter of public lighting, they must march with the times; and their staff must demonstrate to the authorities and the people what was the best lighting system. He himself was not at all devoted to the square lantern which they saw on the top of a post in the streets, and which was really only a survival of the ancient thing that, in the early part of the last century, was used to hold a rushlight, and hung across the road. All that had been done was to add a gas-pipe to it, and a burner—generally a bad one—and call the street lighted. He was himself of opinion that the inverted mantle, which threw its light downwards, with a globe round it having no bars to obstruct the light, with automatic control of lighting, &c., would give a better effect even than the present Welsbach light, and more thoroughly demonstrate the advantages of gas lighting than did the present system. Of course, in speaking thus, he was not in any way binding his colleagues; but personally he hoped they would succeed, by demonstrating to the Municipality, in bringing this about. Their Engineer found a difficulty in pushing the sale of gas for domestic and trade uses other than that of lighting, which had now established itself. Of course, when they asked a man to burn gas in a stove which was going to heat a room or to cook food, or to consume it in driving an engine, melting metals, or in any of the many other processes that were common in this country, he naturally looked at the price; and the result of their experience (and he was speaking in the presence of Mr. Charles Hunt, who had a wide knowledge of these things) was that they must sell the gas cheap. Sitting on the Board for the years he had done, and comparing the progress in reduction of price with that of other companies he was associated with, he had not felt contented with the progress in the reduction of the price of the gas. They had a contract with the Municipality which had yet some years to run; but he was sure the shareholders would agree with him that, if they could make a general reduction to the ordinary consumers, it would be only wise (and the Directors would wish) to make a similar reduction to the Municipality, though the contract might not have expired. In addition to this, anything they could possibly do by adopting new systems to improve what Mr. Thompson had already described as almost matchless, it would be wise for them to do; and they would certainly do it. He was glad to say that, not only had the Company recovered from the drawbacks from which they had suffered through the state of the accounts and the rather neglected condition of the works (which made him almost sorry that Bombay was so far away that he could not go and look things up himself), but their career was now becoming one of peaceful, steady progress. The Board had been impressed by the unhealthy conditions that had surrounded the houses on the works; and the proprietors would be gratified to know that they had authorized a considerable expenditure on the building of bungalows for the staff and also on improving the accommodation for the officers at the gas-works. This had been a matter which had appealed very strongly to their colleague Sir Evelyn Wood, with his great knowledge of Indian life; and although the improvements in the dwellings of their servants might involve an outlay of (say) £2000 or £3000, he was sure it would not be grudged, because unless the men kept their health and strength they could not give the best services to the Company. One word more as to electricity. It was a most valuable and useful element in Nature; but it had been greatly exaggerated by people who induced local authorities and others to invest capital in it. Fortunately, he did not think there was any fear of the Bombay Municipality being led into wasting capital on any such scheme as this. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend of 3½ per cent., free of income-tax, making, with the interim dividend, 6½ per cent. for the year.

Mr. LOUIS PENNY seconded the motion.

Mr. CUFF congratulated the Directors on the very good report they were able to submit. He said it was a very satisfactory feature that the Board were in a position to show another good increase in the private consumption this year. With reference to the suggested reduction in the price of gas, this would be excellent, if they saw their way to bring it about, and thus induce a still larger consumption. But as regarded the Municipality, they had a maximum price with which they were perfectly satisfied under the contract. He would venture to suggest therefore that, in the event of a reduction being possible to other consumers, such reduction might perhaps in the case of the Municipality vary according to the price the Company had to pay for coal—always, of course, being under the maximum.

The CHAIRMAN: A very wise suggestion.

The resolution was then carried unanimously.

The retiring Directors (Field-Marshal Sir Evelyn Wood, V.C., G.C.B., and Mr. W. G. Bradshaw, the Deputy-Chairman) were then re-elected, on the motion of the CHAIRMAN, seconded by Mr. CHARLES HUNT; and the Auditors (Messrs. S. Gore Browne and J. Hill Perrins) were re-appointed, on the proposition of Mr. CUFF, seconded by Mr. FITZMAURICE.

The CHAIRMAN proposed a vote of thanks to the staff; remarking that the greatest zeal, energy, and ability had been shown by the Engineer (Mr. A. R. Burch) and his assistants in Bombay, while their Secretary in London, and his staff, also gave their very best services to the Company.

Mr. S. SPENCER seconded. Referring to the remarks of the Chairman on the subject of lighting, he said that the Corporation of London had sent a deputation to different cities; and when their report was issued, he thought it would be found very favourable to gas. They would already have seen from the "JOURNAL OF GAS LIGHTING" that Mr. C. A. Teuton, the Chairman of the Streets Committee, who went on the deputation, had stated that in some of the cities they had visited there "certainly was quantity, if not quality," of light. He (the speaker) thought that if the burners the Chairman had spoken about were brought into general use in these places, they would be a very great advantage.

The vote was heartily accorded.

Mr. W. WILLIAMS proposed a vote of thanks to the Chairman and Directors; and Mr. F. R. SMITH seconded the motion, which was carried. Mr. Williams said the report was very satisfactory in every way. It was a live, progressive Company; and the Board were entitled to the best thanks of the shareholders for the manner in which they carried on the business.

The CHAIRMAN, in acknowledging the vote, referred to the excellent position now occupied by gas securities from a financial standpoint. He pointed out that at an auction sale a few days previously stocks in some of the smaller companies were disposed of at prices which yielded the buyer in many cases under 4½ per cent. on his money, and in very few

instances over this figure. This showed that confidence had been restored in the public mind with reference to gas as an investment. Some years ago, before the price of coal rose and certain alterations occurred in the labour market, these securities stood at about the same level as now; and he used to prophesy that they would come down to a 4 per cent. basis. But they went back until quite recently. A year-and-a-half ago, one could obtain a yield of 5¼ per cent., and even a little more, in good substantial companies. As, however, he had said, it was now down again to 4¾ per cent., or rather less.

CAPE TOWN AND DISTRICT GASLIGHT COMPANY.

The Depression at the Cape.—Conditions Peculiar to the Colony.

The Ordinary General Meeting of this Company was held last Wednesday, at the London Offices, New Broad Street House, E.C.—Mr. J. E. LILLEY, J.P., in the chair.

The SECRETARY (Mr. H. Yuill) read the notice convening the meeting; and the Directors' report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, in the course of a long speech, said he was pleased to be able to show the shareholders that the Company had done better during the past year in regard to results generally, although they had not done quite so well in respect of the quantity of business. They had, however, been more fortunate in this respect than the majority of people who traded in Cape Colony. Almost every other large undertaking—whether financial or commercial—had had even less favourable results than in 1907. In their own case, they had been able to increase their profits a little—not to a great extent; but he thought they had something on which to congratulate themselves. The make of gas had decreased by about 8 millions; but part of this was a favourable item, inasmuch as the decrease was caused by less gas being lost through leakages. Then a further portion of the decreased requirements resulted from their not lighting the streets of Woodstock during 1908, as was done in 1907. Those who were present at the meeting last year would remember it was stated that the street lighting had been taken from the Company, and that the streets were to be illuminated by electricity. This represented 4 million cubic feet decrease in the requirements for gas. When he mentioned that the total sales were only 3 millions less than last year, although they lost the sale of 4 millions in this one direction, it would be seen that, in the ordinary business, there was a small increase apart from public lighting. The street lighting was not profitable to them; so that, by losing the contract, they did not lose profit. At the same time, the Directors did not like losing contracts for street lighting; and they strove hard to keep them. They served seven municipalities in their area; and they had lit all their districts, except Cape Town, for some years. Seapoint had now also given notice of its determination to have electricity for street lighting. The Directors tried very hard to put the price down below what it would have cost them to retain the lighting. But it was no use; and they knew now they would lose the contract at the end of the year. However, they would not lose profit. The saving in leakage was an important thing; and the Company would benefit from it. A great deal of attention had been given to this matter during the year—in Cape Town almost exclusively. The important streets had been taken up by the municipal authorities, and relaid with asphalte or wood paving. As those shareholders who knew the place were aware, the people of Cape Town suffered severely from dust in their streets; and it was thought that the improved paving would somewhat mitigate the nuisance. The Directors thought it advisable to take advantage of these alterations to carefully inspect the mains and services; and they did this to avoid the liability which might otherwise have devolved upon them later of opening these expensively made streets, and reinstating them. The expense of this would have been very serious. Leakages were found and everything was put in perfect order; and no doubt this was the cause of the decrease in the unaccounted-for gas. At the present time, they were engaged in making a systematic inspection of their mains, taking each district separately. They had increased the number of the consumers. The year started with 5238 consumers; and finished with 5398. At the end of the year, there were 2311 ordinary meter consumers, against 2611 at the beginning; showing a loss of 300. In prepayment meters, however, there was an increase from 2627 to 3087; showing a gain of 460. Therefore, the net gain during the year was 160. The number of consumers could have been increased to an even greater extent; but they had a few important things to consider bearing upon the question. One was the expenditure of capital necessary for the purpose, because the capital had all been expended before 1908. The Directors felt it was necessary to go very carefully into the installation of prepayment meters. They used to bear the whole of the expense; but this was changed now. For some time past, they had required any person who wanted an installation on the prepayment system to bear a portion of the cost. It was found that this answered very well; and they would continue the practice so long as they could increase the business on these terms, because a person would not expend money to have pipes carried into his house if he did not intend to use them. Their practice was to put in a certain number of new installations as they were required, and where it was thought they would give them the best results, and then to pause for a little while, and see whether satisfactory returns were being obtained from them. If they were, then they canvassed for new customers, and were generally successful in getting them. During the year they had to disconnect 1726 meters from their customers. Anyone who knew anything about gas supplies would consider this a large proportion of the 5000 odd. Nearly all these were cases of customers who were leaving their houses. Of course, this was a great expense, as their district was a wide one, measuring nearly 15 miles from one end to the other. Cartage there was much dearer than here; and so the expense of sending men to make these disconnections and remove the meters was very considerable. However, they had one compensation; and it was that during the past year they were enabled to connect 1886 meters while removing 1726. These constant changes, nevertheless, were a serious expense; and the Directors would be very glad indeed when circumstances and the conditions of living in Cape Town were such that people did not have to remove so frequently. During the year they had made a little saving on the price of coals, and a greater saving on the freights—putting the two together, coal had cost 2s. 2d. per ton less than in 1907. But this did not account for the whole of the saving in the manufacture, because a part of it was due to the increased production of gas per ton of coal carbonized. The Directors had made satisfactory arrangements with regard to freights until June, 1910. Respecting coal, they had made no contracts. They did not do so last year; and they found a little advantage in watching the market carefully, and buying as prices became lower. So far this year they had succeeded in purchasing their coals quite as favourably as last year, and perhaps he might say a little more so. As to residuals, they had done a little better than the previous year. Three years ago they had a tremendous incubus of coke that at the time they could not move. It amounted to over 3000 tons; but at the end of last year they only had 562 tons. They had reduced the stock still further; and they hoped to clear the coke yard soon. As to breeze, the sale was entirely at a standstill. The brick makers were their best customers for this commodity; but they were idle now. A market had consequently to be found for it, wherever possible, at greatly reduced prices. Regarding tar, they had done decidedly better during the year; but this was not an item that came to very much. Still the sales of tar were good; and they were getting a better price than in the preceding year. The whole of the gas making was now being done at the Woodstock works; and they found they could work quite satisfactorily from the one station, and make considerable savings. If the shareholders looked at the revenue account, it would be seen that in the cost of manufacture and distribution of gas, there was a saving of between £5000 and £6000. This, however, must not be taken as a net saving, because the make of gas was less and the sales were less, taking everything into consideration. Though it was not all profit, it showed considerable savings had been made. As to repairs and maintenance of works, they had been carrying out the alterations necessary to enable them to do all their work at Woodstock. The alterations cost well over £2000, beyond what would have been incurred for usual repairs in an ordinary year. Inasmuch as the Directors had come to the conclusion to make further alterations during this year to complete their arrangements, they had thought it better to pay the whole cost out of the year's revenue. One alteration had been to put in through retorts in place of the old short, single ones. A sum of £2000 had also been written off the value of the stocks; and everything was now at a realizable price. The investments had been written down to their market value at the end of December last, and for this £412 had been deducted from the profits. They had restored to the reserve fund rather more than the amount they had to take from it last year, by transferring to it £1300. Then they had put £400 to the workmen's accident insurance fund. This was really more than the insurance for one year; but the Directors felt they would like a little nucleus to start with, and so raised the fund from £100 to £500. The reason they took this step was that the insurance rates were high; and they thought it better to have their own fund. Insurance rates, however, were now sinking; and the Directors would always be willing to insure through a company if they were satisfied the premiums would be better than having a fund of their own. So far, however, the workmen's accident claims on them had not amounted in the past two years to £20. It would be seen that they had taken out of the year's profits above £5000, and applied the money to purposes which certainly consolidated and strengthened the Company; and, in addition to this, they carried forward a larger sum by £1600. It was, however, with great regret the Directors felt it necessary not to pay any dividend. If the shareholders, however, would look at the capital account, it would be found that £6887 was expended last year; and they had no capital to draw upon for this money. Just after Dec. 31, too, debenture interest fell due, and payments for coal and other matters had to be made. Regarding capital, they charged nothing to the account excepting for services and mains. A large main had been finished from Woodstock to Cape Town, to enable them to supply gas from the former works; and the services for new installations had required about £4000. These installations, however, brought them in new business. The results from the prepayment meters, though not so good now as in the past, still remained so good that they paid well to instal. From each service, the Company obtained nearly £5; so that it did not take an unreasonably long time to pay for the installations after deducting the profit for each year. Part of the expenditure of the year that ordinarily would have gone to capital, the Directors put entirely to repairs and maintenance. They wanted to consider the capital account closed for all purposes if possible, except such as would bring in increased revenue. Among other work of the year had been the resheeting of the crown of a holder, and some necessary alterations to the framework; and £700 had been expended for this. There was no improvement in the general condition of affairs at Cape Town at the present time. Business he believed was a little better; but, taking things on the whole, affairs there had been just about as bad as they possibly could be.

The VICE-CHAIRMAN (Mr. H. R. Savory) seconded the motion.

Mr. W. H. HARDING and Mr. JAMES RANDALL put a number of questions, chiefly bearing upon the accounts.

The CHAIRMAN, in the course of his reply, said he did not think anyone could have secured a greater reduction than 2s. 2d. per ton on freights and coal together. At the end of 1907, the coal they had in stock had cost them on this side about 11s. per ton. By the time it reached Cape Town, it had cost them 34s. per ton, including Government duty, dock charges, and so on. To get the coal delivered into their stores cost them 4s. per ton. At the end of the past year, the price delivered on board ship was 9s. 9d. per ton; and this year the total cost would be 32s. to 33s., including all charges. The Directors had quotations for coal from various collieries; but they did not change from the class employed now for some years unless they saw some distinct advantage in doing so. They adopted South Pelaw coal, and found it answered their purposes admirably, both with regard to gas and coke. There was little demand for gas for heating purposes in Cape Town. At the price they were compelled to charge, few people would employ gas for heating. They, however, supplied a large number of cooking-stoves, both on the ordinary and prepayment meter system. As to a revival of trade, he had no hesitation in saying that the present year would be much better than last; but he was sorry

to say the first three months of the year, compared with the corresponding period of last year, showed a considerable decrease in the demand for gas. During the middle of last year, there were some heavy failures in the way of restaurants and hotels, which used gas almost exclusively for cooking. The Company had consequently lost the business of these places. The Government and the municipalities had also reduced their staffs. All this had lowered the spending power of the people in Cape Town; and now the number of empty houses and shops was most serious. Through this, no doubt, the Company had lost a considerable number of consumers. By canvassing hard, however, they had already recovered a large number of customers. They had, in fact, pressing demands for new meters, prepayment services, and so on; and therefore he did not feel at all depressed on this subject.

The motion was unanimously carried.

Resolutions were passed, re-electing the retiring Director (Mr. R. A. Fairclough) and the Auditors (Messrs. C. F. Kemp, Sons, and Co.).

The usual complimentary votes terminated the proceedings, which had been somewhat protracted.

BAHIA BLANCA GAS COMPANY, LIMITED.

Progress of a New Undertaking.

The Second Ordinary General Meeting of the Company was held last Thursday, at the London Offices, No. 1, East India Avenue, E.C., under the presidency of Mr. J. C. IM THURN, the Chairman.

The SECRETARY (Mr. J. M. Macmorran) read the notice convening the meeting; and the report and accounts (noticed on p. 402 of last week's "JOURNAL") were taken as read.

The CHAIRMAN, in moving their adoption, pointed out that they referred to the last half of 1908; and he thought he might claim that they were satisfactory, having regard to the fact that they only commenced gas making in the autumn of 1907, and that the Board were already in the position of being able to recommend a dividend—though only a small one. He believed that, for a gas undertaking started in a town which was still in the making, it was somewhat unusual to be able to make such an early beginning as they did with the payment of dividends. There was not much to be said about the accounts themselves; probably it would interest the shareholders more to hear what the Directors thought of the future. Since the meeting in November last, the business had made steady progress. He told them then that they had 1250 meters and 420 stoves in use; whereas by the end of last month (April) there were 1450 meters and 500 cookers fixed. They had now commenced to supply gas for the public lamps, having obtained a contract for 41 lamps, which number, the Board had reason to believe, would ere long be considerably augmented. In view of the fact that the intervening months, from December to April, were the summer months, when the days were very long, and the heat very great, he regarded this result as satisfactory. Their Manager (Mr. Percy Bridger) wrote on April 15 that he was receiving many applications for installations, and that as the cold weather came on he expected to have a very busy time. There were now 33 miles of mains laid, as compared with the 9 miles which were originally projected, and as against the 29 miles mentioned by him last November. Now that the business was developed, he thought they might look forward to a continued and steady increase in consumption in the immediate future. In fact, the Directors regarded the prospects as excellent in every way. There was a sufficient stock of coal on hand, and paid for, to last until the middle of September; and the latest advices were that residuals were selling well, and accumulations of stock were being avoided. The Board had been able to increase the mileage of mains to the extent he had stated, and to hold a stock of coals, &c., to the value of £28,823, without calling on the shareholders for any more money, though it had depleted the modest working capital with which the Company started. Should further large developments be projected, it might be necessary to take steps to meet the outlay; but the Directors had no reason to anticipate anything of this nature at present—the more so as the Committee had wired that they would be able to supply the Board with regular remittances during this year. The gas consumption from January to April last was 292,306 cubic metres, as compared with 203,200 cubic metres for the same months of the previous year. This was an increase of 43 per cent.

Mr. ROSS PINSENT seconded the motion; and after one or two shareholders had drawn attention to the meagreness of the report, the resolution was carried.

On the proposition of the CHAIRMAN, seconded by Mr. PINSENT, a dividend on the "A" shares of 2 per cent., free of income-tax, on the working of the Company up to Dec. 31, was declared.

Subsequently the retiring Director (Mr. Pinsent) and the Auditors (Messrs. Arthur Goddard and Co.) were re-elected; and the meeting was brought to a close with the customary vote of thanks.

Increased Gas Profits for the Rates at Wigan.—At a meeting of the Wigan Gas Committee last week, the Engineer (Mr. J. Timmins) submitted his report. This stated that the profit on the undertaking for the past year was £11,704, including £5402, which was the cost of public lighting. It was decided that the sum of £4000 should be handed over to the general district rate. The amount of the profits contributed to the district rate last year was £3000.

Results at Tiverton.—At a meeting of the Tiverton Town Council last week, Mr. J. Thorne submitted the financial results of the year's operations of the gas-works. The gross profits were £2547; sinking fund contribution, £1307; and interest, £1154. This left a balance to the good of £86. But for the reduction during the past year of 2d. per 1000 cubic feet in the price of gas, the net proceeds would have been £200 more. The total amount now in the reserve fund is £3073; and in the sinking fund, £14,045. The profits accumulated since the works have been in the hands of the Council amount to £17,199 3s. 7d. Mr. Thorne paid a high tribute to the work done for them by the Gas Manager (Mr. C. Jeffery).

FINCHLEY ELECTRIC LIGHTING SCHEME.

Echo of Local Government Board Inquiry.

Arising out of the recent Local Government Board inquiry into the application of the Finchley Urban District Council for a loan for arc lighting, at the last meeting of the Council Mr. Rabbidge, who was one of the witnesses at the inquiry, brought forward what he said was a grievance in connection with the matter. He stated that in 1905 a letter was received by the Council from the Local Government Board to the effect that, in future applications for loans for street lighting, the terms of the Gas Company should be ascertained. He complained that the contents of the letter were never communicated to the Council. The Chairman (Mr. W. C. Cope) said the letter was brought before the Finance and Electricity Committees; and on Sept. 19, 1905, it was read at a meeting of the Electricity Committee at which Mr. Rabbidge was present. Mr. Rabbidge retorted that he did not remember it. The Clerk read the letter, which was dated Aug. 31, 1905, and which suggested that in future the District Council should carefully consider the cost of street lighting by electricity as compared with that of lighting by gas. The Clerk said the letter was fully set out in the report of the Finance Committee which was circulated to every member. Mr. Bloomfield said he understood from the letter that the Local Government Board only made the suggestion that the Council should get terms from the Gas Company; there was no instruction. The Chairman: They have no power to give such an instruction. Mr. Bloomfield said the Lighting Committee did consider the question of lighting by gas, and decided against it.

The Chairman said he did not care whether the Council had arc lighting or not; but he did complain that the inquiry had been turned into a discussion on Electricity *v.* Gas. The Gas Company had put forward the plea that they were the second or third largest ratepayers; but they were there for their own profit. It was stated that the Council were losing money on the street lighting; but if they were going to throw over this proposed extension, they would be losing a big customer and more money. He did not think any sane man with a business undertaking such as the Council's lighting would hand over a portion of it to a rival Company. If the light was not good enough, let them improve it; but so long as he remained a member of the Council, he would not consent to their taking it from an opposition Company.

Mr. Tew asked whether, in view of the great opposition to the arc lighting scheme, it was the intention of the Council to proceed with it. Mr. Royston, in reply, said the Council had a motion to that effect; and Mr. Tew might show his opposition in a tangible manner by bringing forward a motion to rescind it. He proceeded to point out that Mr. Tew had charged him with misrepresentation in stating at the inquiry that the Highways Committee were unanimously in favour of the loan for arc lighting. This, however, was a fact; and Mr. Tew himself supported the resolution to this effect at all the meetings of the Committee except the last, at which he was not present. Prior to the last meeting Mr. Tew told him he was no longer in favour of arc lighting, but did not intend to vote against it. He (Mr. Royston) therefore felt that he was justified in telling the Inspector that he had had no official notice of any opposition from a member of his Committee until the evening before the inquiry.

BUSINESS METHODS AT SUNDERLAND.

Assisting the Electricity Undertaking.

A new bridge across the River Wear is to be opened at Sunderland; and the Town Council have been discussing a recommendation of the Committee concerned that the lighting should be by electricity. Alderman Fairless, in moving the adoption of the recommendation, said he would be candid in regard to the matter. The Committee had before them estimates as to the cost of lighting by electricity and by incandescent gas. They found that the installation of electric light would cost £331 more than gas, and the maintenance expense of electricity would be £33 a year more than gas. Still, in view of the fact that the Council themselves would supply the electricity, they recommended it. Mr. Hoey moved, as an amendment, that they accept the estimate of the Gas Company. He said the lighting of the bridge by electricity would cost for the installation £457; while the cost for the gas installation would be £126. With regard to upkeep, electricity would cost £156, against £123 for gas; the light in both cases being of the same candle power. In his view, apart from cheapness, gas would give them a better light. Mr. Lawson seconded the amendment. The tender for electric light came, he said, from their own Electricity Department. If the offer had come from an outside company, they would not have entertained it for a moment; it would have been "laughed out of court." These tenders had not been considered on their merits by the Committee; but, on the contrary, the electric light was recommended because it was supplied by their own department, to which they proposed to give preferential treatment. He was utterly opposed to any such method of bolstering up the Electricity Department; and, in his opinion, such a course would do harm in the long run. Alderman Turnbull supported the recommendation of the Committee. It was contended, he said, that incandescent gas lights were better than electric lights. Let anybody who had these incandescent lights inside his shop give them due attention; and he would find that after the first three or four nights they would begin to go wrong. Electricity would be the light of the future. The amendment was lost by 13 votes to 26; and the recommendation of the Committee was then adopted.

Referring to this decision, the "Sunderland Daily Echo" says: By 26 votes to 13, it was resolved to adopt electricity, though, as Alderman Fairless "candidly" said, in moving the adoption of the report, this would cost £331 more for installation than incandescent gas, while the cost of maintenance would be greater. "Still," the worthy Alderman added, "in view of the fact that the Council themselves would supply the electricity, they recommended it in preference to gas." Here we have an implied avowal that, in order to enable our electricity under-

taking to make a better show than otherwise it would, the spirit of business in respect of expenditure should be held in abeyance. This kind of thing is not new. Our Tramways Committee are paying much more for current than private companies are charging tram services in other parts of the district, so that the Electricity and Lighting Committee may present reports as little funereal as possible. Facts of this kind, together with strong presumptions that plant is being maintained in the books at excessive valuations, are not calculated to render the electricity undertaking a "proud argument" in favour of municipalization.

GAS-METER TESTING IN MANCHESTER.

Particulars of the Index Test.

In his sixteenth annual report to the Machester City Justices, Mr. S. Dyson, the Official Inspector of Gas-Meters, says the number of meters tested during the year to March 31 amounted to 38,559, showing an increase of 135 as compared with the previous year. The fees received amounted to £1536; being an increase of £73. The amount expended on equipment for the year was £47; and this, together with the ordinary expenditure of £1844, makes a total of £1891.

There were 1277 meters rejected, or 3·30 per cent. Of the total wet meters tested—viz., 11,538—374, or 3·22 per cent., were rejected; and of 27,021 dry meters tested, 903, or 3·3 per cent., were rejected. The number of meters rejected increased from 605 to 1277, as compared with the previous year, or from 1·59 to 3·30 per cent. This increase was owing to a number of old meters being tested which belonged to the gas consumers, by whom they were purchased prior to the meter-rents being abolished.

The "index test" has been applied in the office since 1902 to all gas-meters belonging to the Corporation. The test was instituted by mutual arrangement between the Justices Testing Committee and the Gas Committee (in the absence of statutory powers), for the protection of the gas consumers in the city. During the past year, the indices of 10,391 dry meters and 8448 wet meters were tested; and 85 of these were rejected. The most serious cases of error were found in three meters, which had been repaired by the manufacturers; and, before being put into use again, they were submitted to the office for testing, with the following results:—

Two 3 light index transposed, registering 100 per cent. fast.
One 5 ,, incorrect gearing, causing meter to register backwards.

Table Showing Cause of Defects in Meters Rejected by "Index Test."

Upright Shaft Out of Action with Drum Shaft.	Incorrect Number of Teeth in Index-Wheels.	Defective Front Plates and Inaccurate Marking.	Damaged Fittings and Wheels.	Index Wheels Out of Action.	Incorrect Gearing.	Indices Transposed.	Total.
14	4	34	17	13	1	2	85

Mr. Dyson says the London County Council, the Manchester Justices Testing Committee, and other gas-meter testing authorities, have at various times made representations to the Board of Trade to amend the law in regard to gas-meter testing. Last year the Board of Trade issued a circular-letter asking the testing authorities throughout the country for any observations they might see fit to offer as to the adequacy of the provisions of the existing Acts with regard to present testing requirements. In June last, the Standards Department of the Board of Trade appointed a Departmental Committee to consider what amendments are necessary in the Sale of Gas Acts with reference to the testing of meters. The meetings of the Committee (on which Mr. Dyson served) were held at Westminster; and Mr. Dyson submitted specially-designed machines for facilitating the testing of indices, and also wet and dry meters, showing a simple contrivance for detachable indices. The Board have the matter still under consideration.

The periodical re-verification of meters, adds Mr. Dyson, is also of great importance to both consumers and producers of gas. There are no compulsory powers at present for this. After meters are once tested and fixed on the premises of consumers, it is customary to allow them to remain in use for many years without being re-tested. He has known meters of this description with their original seals attached and unbroken for from 20 to 30 years without being retested; and he says that in all probability the majority of these meters would be registering inaccurately. The Manchester Corporation recently decided that all gas-meters should be retested which are owned by the consumers, and had been used by them in the Manchester area of supply for a period of ten years. From the results thus obtained, Mr. Dyson remarks, it would appear that the Corporation were well advised. Out of a total of 676 such meters tested, there were only 135 found correct; while 541 were incorrect, or 80·1 per cent. The London County Council advocate for the proposed Amended Act the abolition of the internal soundness test of all new meters. They consider this test "unnecessary, and that it greatly delays the testing operations." Mr. Dyson, however, observes that it would be unsatisfactory to stamp a meter as correct without first ascertaining that it is internally sound, as no reliable registration test can be obtained with an unsound meter. He has devised an arrangement whereby two meters can be tested simultaneously. While one meter (which is internally sound) is undergoing the registration test by the standard holder, the second meter is connected to a leakage meter and tested for both internal and external soundness under the prescribed pressure of 3 inches. This arrangement, he says, will greatly facilitate the internal soundness testing of meters, and will to some extent overcome the objection of the London County Council.

Messrs Fletcher, Russell, and Co., of Warrington, have issued an illustrated booklet dealing with their patent indestructible gas cooking-ranges, and other domestic appliances—including water-heaters. On the front of the cover are two pictures showing "the cheapest methods of cookery known." The first (or primitive) is of a Maori cooking at a natural hot spring; and the second (or scientific) is of a housewife using one of the firm's gas-cookers.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards held a sale of gas stocks and shares, at which remarkably satisfactory prices were realized; there being keen competition for the various lots by the large number of bidders who attended. The average prices realized per £100 of stock, the dividends at present paid, and the yield per cent. on the average purchase price, were as follows: Lea Bridge District Gas Company, £1000 of consolidated ordinary stock (present dividend 6 per cent.), average price per £100 of stock £124 1s.; yield upon investment, £4 16s. 9d. per cent. Ilford Gas Company, £1000 of ordinary "C" stock (dividend 6¾ per cent.), average price £137 11s.; yield, £4 14s. 6d. per cent. Bromley and Crays Gas Company, £1000 of "C" ordinary stock (dividend 5½ per cent.), average price £114 19s.; yield, £4 15s. 8d. per cent. Hornsey Gas Company, £1500 of 5 per cent. preference stock, average price £118 10s.; yield, £4 4s. 5d. per cent. Maidstone Gas Company, £992 5 per cent. capital stock (dividend £7 5s. 6d. per cent.), average price £148 6s.; yield, £4 18s. 2d. Pinner Gas Company, Limited, 200 £5 fully-paid "B" shares (dividend £7 17s. 6d. per cent.), average price £8 7s. 9d. each; yield, £4 13s. 11d. per cent. Romford Gas and Coke Company, Limited, 180 £5 "B" shares (dividend 9 per cent.), average price £9 3s. 7d. each; yield, £4 18s. per cent. Romford Gas and Coke Company, Limited, a 4 per cent. debenture bond for £1000, price £97 per £100; yield, £4 2s. 6d. per cent. Wandsworth and Putney Gas-light and Coke Company, £1496 of 3 per cent. debenture stock, average price £77; yield, £3 17s. 11d. per cent. Guildford Gaslight and Coke Company, £1425 of ordinary stock (dividend 5¾ per cent.), average price £118 18s. 7d.; yield, £4 16s. 9d. per cent. Eastbourne Gas Company, 61 £10 fully-paid "B" shares (dividend 12 per cent.), average price £28 10s. 9d.; yield, £4 4s. 1d. per cent. Southgate and District Gas Company, £500 of 5 per cent. preference stock, price £116; yield £4 6s. 2d. per cent. Southgate and District Gas Company, £300 of 4 per cent. perpetual debenture stock, price £100 10s.; yield, £3 19s. 7d. per cent. Cromer Gas Company, £1000 of ordinary stock (dividend 2 per cent.), average price £44 12s.; yield, £4 9s. 8d. per cent. Southend Gas Company, £500 of new ordinary stock (dividend 5¾ per cent.), average price £118 14s.; yield, £4 16s. 11d. per cent. Southend Gas Company, £500 of new ordinary "B" stock (dividend £5 7s. 6d.), average price £113 8s.; yield, £4 14s. 9d. per cent. Some days ago, Messrs. Fenn and Co. sold locally by auction some "A" and "B" shares of £20 each in the Colchester Gas Company. The "A" shares were disposed of for £46 10s. each, and the "B" shares at prices ranging from £31 5s. to £34 10s. At another local sale, 210 £1 ordinary shares in the Morpeth Gas Company, Limited, realized from 25s. to 25s. 3d. each; while 66 £1 preference shares fetched from 25s. 3d. to 25s. 6d. each. Last year's dividend on the ordinary shares was 6 per cent., and on the preference 5 per cent. At a sale by auction last week, some £10 shares in the Torquay Gas Company, bearing a dividend not exceeding 10 per cent., realized £23 7s. 6d. per share; and £10 shares bearing a dividend of 7 per cent. sold at £16 2s. 6d. to £16 12s. 6d. per share. At Wakefield, some days ago, 21 £25 shares in the Wakefield Gaslight Company were offered for sale in four lots; the prices realized being from £63 2s. 6d. to £63 7s. 6d. each. Afterwards 57 £5 shares in the same Company were disposed of in six lots; the prices realized being from £12 15s. to £13 each. £435 of 4½ per cent. preference stock in the Company was sold at £111 per £100. Fifteen £10 shares in the Bridlington Gas Company realized from £33 15s. to £34 2s. 6d. each. Then £100 of consolidated "B" stock in the Harrogate Gas Company was sold at £325; and £100 of consolidated "C" stock in the same Company, at £310.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

A decision was given by Lord Johnston in the Court of Session on Thursday which may be of some help to corporations in regard to their duties with respect to public lighting, as regulated by section 99 of the Burgh Police (Scotland) Act of 1892. The section is as follows: "The Commissioners shall make provision for lighting in a suitable manner all the streets and all other places within the burgh which, in their judgment should be lighted at the public expense, and shall provide, erect, and maintain, such a number of lamps, lamp-posts, and lamp-irons, and other appurtenances as may be necessary for this purpose, and shall light, or shall enter into contracts for lighting, and cause to be lighted, such lamps by means of gas, or such other light of an improved kind, subject to the provisions of the Electric Lighting Act of 1882, or any Act or Acts amending or superseding the same, as they may find expedient." The Police Commissioners of Tranent have equipped the burgh with a complete installation of gas lighting, and have adopted a scheme of lighting such as is common in all the smaller burghs, in which, among other things, the street-lamps are not lighted at all between certain dates in the summer season, and in winter when there is moonlight. On the evening of Sept. 5 last, when the moon was past its first quarter, and did not set till after eleven o'clock, their scheme provided that Bridge Street should not be lighted. On this evening, a miner, who, the Commissioners said, was under the influence of drink, was knocked down by a motor-car in Bridge Street and killed. The widow raised an action against the Corporation for £500 damages; and founded her action upon the failure of the Commissioners to have the street properly lighted. The Corporation pleaded in defence that the accident was due to the fault of the deceased; and, further, that it had never been considered necessary to light the lamps at that date, that they had discretionary power as to what streets were to be lighted, and as to the hour of lighting them, and that, in deciding not to light Bridge Street at the period of the year in question, they duly exercised the powers and discretion committed to them by the Act, and were not in fault. Lord Johnston said that the Statute imposed an absolute duty upon the Commissioners to light. As to whether the

provision for lighting on this particular evening between eight and nine o'clock complied with the requirements of the section was a question of fact requiring proof. If it were proved to be necessary, then the Commissioners had a duty to light; and if the consequences of their not lighting were an accident, they were responsible for it. The discretion confided to the Commissioners had reference to "other places within the burgh" which could not be provided for by the General Statute, and as to the lighting of which the burgh authorities must apply their judgment. If, in their judgment, they did not want to light, there was no obligation upon them to do so; but that there was an obligation upon the Commissioners to light the streets he had no doubt. He therefore repelled the defenders' plea as to discretion. He was of opinion, however, that the case was otherwise not relevant, because it was not set forth why the deceased did not see the bright lights of the advancing car. The deceased had a duty of self-preservation; and the pursuer's own statement did not negative the possibility that the accident was due to the deceased's want of care. He therefore dismissed the action as irrelevant, with expenses. The judgment amounts to this, that no time-table as to seasons or the state of the moon will avail to avoid an action in the event of an accident. It is imperative that the streets be lighted whenever it is dark, irrespective of any resolution of the Police Commissioners. The decision has a wide-reaching effect. Moonlight, for instance, is subject to great vagaries. It is matter of common knowledge that when the almanac shows there should be sufficient moonlight, it is frequently not experienced. Police Commissioners who, for reasons of economy, instruct, at the beginning of the lighting season, that the lamps shall not be lighted on certain dates, will not be safe. They must make up their mind night by night, as to whether or not the street lamps are to be lighted. And even if they should make up their minds at (say) eight o'clock that the lamps should not be lighted, and a sudden darkness should come on later, and an accident happens, they would be liable. The conclusion to be drawn is that it would be safer for corporations to have all their lamps lighted every night, and throw economy to the winds. This will be hard upon the smaller burghs. How about the larger towns! In the city of Edinburgh for instance, for reasons of economy, from the beginning of May onwards during the summer months, every second lamp is not lighted. Under this decision, suppose an accident were to happen near an unlighted lamp, the Corporation would be held liable, because, having the provision for adequately lighting the thoroughfare, they had failed to light it.

A writer in the "Dundee Advertiser" to-day states the opinion that it will be gratifying to the ratepayers, whose burden of taxation in other respects will certainly be increased, to learn that a reduction in the price of gas is practically assured. Notwithstanding dull trade, the accounts of the Gas Department for the year are in a highly satisfactory condition. There has been a large increase in consumption over the estimate, with a proportionate enhancement of revenue. Further, as a result of a series of experiments extending over the past two months, the cost of producing gas has been materially reduced, by which means a saving of some £2000 has been effected. The state of the accounts is such that it will be possible to make a reduction to the ordinary consumer of 1d. per 1000 cubic feet—from 2s. 4d. to 2s. 3d.

In the Kirkcaldy Town Council on Monday, the Gas Committee reported that they had considered which Act they should proceed under in the purchase of the gas-works, and that the Town Clerk had explained to them that there were two Acts which dealt with the subject—one the Kirkcaldy Burgh and Harbour Act, and the other the General Act known as the Burghs Gas Supply Act. The suggestion had been made that a Private Act might be promoted by the burgh for the purchase of the gas undertaking, one of the objects of which would be to get more favourable conditions for the sinking fund. There were, however, objections to the promoting of a Private Act. The Committee, therefore, unanimously recommended the adoption of the Burghs Gas Supply Act of 1876, which the Council agreed to.

Instead of erecting entirely new gas-works outside the burgh, as was contemplated by the Corporation of Burntisland four months ago, the Town Council have resolved upon extending the existing works by the addition of a gasholder only, which, it is hoped, will be in use by the end of the year.

In the Markinch Town Council on Monday, Mr. M'Corquodale moved that it was desirable, in the interests of the ratepayers, that the gas supply should be under municipal control, and that a Committee be appointed to consider the question and report. The motion was adopted unanimously, and a Committee was appointed.

In the Hamilton Town Council on Tuesday, the Gas Commissioners reported that the railway siding into the gas-works had now been completed, and that the Caledonian Railway Company had agreed to work the siding without any extra charge in the meantime—this arrangement being terminable on one month's notice. The Manager had been requested to see that the shunting of waggons be carried out as speedily as possible. Satisfaction at the result was expressed; and the Council agreed to pay the Railway Company their account for the cost of construction, including extras—the amounts being £2082 and £220.

It was reported to the Arbroath Town Council on Monday that in the period from May 15 to March 31 there had been an increase in the output of gas to the amount of over 1½ million cubic feet, as compared with the previously corresponding period. The Gas Manager—Mr. A. C. Young—reported that progress had been made with the construction of the tank for the new gasholder, and the concrete foundation was partly laid down. A circular from the Sulphate of Ammonia Committee was submitted, in which it was stated that there was a proposal to extend the use and sale of sulphate of ammonia by propaganda work, and the Council were asked what assistance they would give towards meeting the expense of the work. The Gas Committee were satisfied that any expenditure of this kind would be remunerative; and they recommended, for this year, a contribution at the rate of 1s. per ton on the amount of sulphate produced and sold at the gas-works. The Council agreed to this proposal.

An attempt has been made by the North of Scotland Electric Light and Power Company, Limited, who supply electricity in Montrose, to capture the lighting of Dorward's House of Refuge in the town; but it has not been successful. An offer by the Company was considered by the House Committee some month ago, and was very favourably received. Since then the Gas Manager—Mr. A. Mackay—put himself in communication with the Committee, and laid before them reasons why gas should be retained as the lighting medium, which were so cogent that, when the subject came before the Managers of the Institution on Monday, it was found that a number of the members of the House Committee had changed their minds, and were favourable to the retention of gas. It is interesting to note that it was not an offer of a cheaper light, for the cost—£27 15s. per annum—was quoted as being much the same as is paid for gas, which fetched the Committee at first, but an offer of free wiring. The price quoted was for a supply of 1000 units per annum, which was thought to be sufficient for the house, if care were exercised; but the members of the Committee came to be doubtful if this quantity would suffice. The Superintendent of the house seemed in favour of electricity, for he reported that there had been frequent escapes of gas from leaking pipes. Mr. Mackay, however, stumped the objection to gas by offering to examine all the pipes and put them right, free of cost. The Manager of the Electric Company had been shown Mr. Mackay's letter; and he wrote stating that many of the statements in it were grossly exaggerated, and could not be permitted to pass unchallenged. He did not, however, condescend upon what he regarded as exaggerations; and the Managers, without a dissentient voice, resolved to accept the Gas Manager's offer.

The Glasgow Corporation Water Committee recommend that the domestic water-rate within the limits of compulsory supply be reduced from 5d. in the pound, at which it has stood since 1899, to 4d. The rate beyond the limits of compulsory supply is to remain at 8d., and the public water-rate at 1d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 15.

Sulphate of Ammonia.

The market opened quietly; but towards the close there has been more demand for covering May contracts, and a slight recovery from the lowest prices touched. Direct buying has, however, been in but small compass, and there has not been any substantial improvement in values. The closing prices are £11 2s. 6d. per ton f.o.b. Hull, £11 3s. 9d. per ton f.o.b. Liverpool, and £11 6s. 3d. per ton f.o.b. Leith. There has also been considerable inquiry for the later months of the year and for spring delivery; but makers' prices are still prohibitive, and any business done abroad has been taken speculatively. The near months have been neglected, though prices very little above the spot level have been quoted.

Nitrate of Soda.

This market has been quiet, but very steady on spot; the quotations being 10s. 4½d. per cwt. for 95 per cent., and 10s. 7½d. for refined quality.

LONDON, *May* 17.

Tar Products.

Tar products have been steady throughout the past week. Pitch has been very firm, and prices have advanced all round. Not much business has, of course, been done for prompt, with the exception of South Wales, where they have been purchasing for near delivery for fear of a strike later on. Creosote has been steady. The market is quiet in London, where there is some disposition to sell for prompt delivery. In the Midlands, makers are comfortable. In Yorkshire, a considerable quantity has been cleared out, and makers are now asking improved prices. Carbolic is steady; but the market is apparently kept up by speculation, and makers do not appear to be buying. Benzols are still weak. Solvent is steady in London and elsewhere. Heavy oils are quiet. Tar is advancing slowly.

The average values during the week were: Tar, 14s. to 18s., *ex* works. Pitch, London, 26s. 6d. to 27s.; east coast, 26s. to 26s. 6d.; west coast, 25s. 3d. to 26s. 3d. f.a.s. Mersey ports, 25s. 3d. to 25s. 9d. f.o.b. others. Benzol, 90 per cent., casks included, London, 5⅞d. to 6d.; North, 5½d. to 5⅝d.; 50-90 per cent., casks included, London, 6½d. to 6⅝d.; North, 6d. to 6¼d. Toluol, casks included, London, 8½d. to 8⅝d.; North, 8d. Crude naphtha, in bulk, London, 3½d. to 3⅝d.; North, 3d. to 3⅛d.; solvent naphtha, casks included, London, 11d. to 11½d.; North, 9½d. to 10d.; heavy naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d. Creosote, in bulk, London, 2⅝d. to 2⅞d.; North, 2½d. to 2¾d. Heavy oils, in bulk, 2⅝d. to 2⅞d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 2d.; west coast, 1s. 1d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1½d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market has been very quiet throughout the past week, and prices have declined. London makes on Beckton terms are quoted £11; and £10 18s. 9d. to £11 is the ruling figure in Hull. In Liverpool, £11 is said to have been accepted. In Glasgow, £11 2s. 6d. was taken; while in Leith, the market closes at £11 5s. to £11 6s. 3d. The fall in sulphate is remarkable when the advancing prices and good demand for nitrate of soda is taken into consideration.

Hinckley Gas Supply.—The report of the Gas Manager (Mr. Fred Lee), for the year to March 31, was presented to the Hinckley Urban District Council a few days ago. The net profit made on the gas undertaking during the twelve months was £2683; being about £800 less than in the previous year, owing to the reduction in the price of gas. It was recommended that, in addition to the sum of £1054 already transferred to capital account and £864 to special renewals fund, an amount of £520 be transferred to the general district rate, and the balance carried forward. The coal used during the year was 6967 tons, compared with 6826 tons. The gas manufactured was 75,106,000 cubic feet, being an increase of 1,466,000 cubic feet; and the quantity sold amounted to 72,783,600 cubic feet. Owing to depression in trade, the gas consumed in the factories was 3,000,000 cubic feet less than in the preceding year.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade is rather uneven in tone, through the rumours of labour difficulties in other districts, which make both buyers and sellers here reluctant to enter into forward sales, though, at the same time, it stimulates the demand for early delivery. Best Northumbrian steam coals are about 12s. 1½d. to 12s. 3d. per ton f.o.b.; and second-class steams are from 10s. 3d. to 10s. 9d. Steam smalls rather vary in price—from 5s. to 6s. 6d. per ton; the demand being fair and the supply full, so that the shipments are heavy. In the gas coal trade, the inquiry is now rather less for local use; but the exports are steady, and Baltic shipments are being regularly made, as the Northern ports are generally open. Durham gas coals vary in price, according to quality—from about 9s. 1½d. to 10s. 3d. per ton f.o.b. for the usual classes; while for "Wear Specials," up to 11s. is quoted. There is less doing in contracts at the present time, for the reason above stated. A few sales for export are, however, being made; and prices in such cases seem to be tolerably firm, more especially when early delivery is needed—the uncertainty as to the Mines Hours' Act having its influence on later delivery. In the coke market, the demand is better for export. This and the lessened production make gas coke firm; the quotation being from 12s. 6d. to 13s. per ton f.o.b.

Scotch Coal Trade.

There is little change to report. The fear of trouble over the wages question on account of the Eight-Hours Act (which comes into force on July 1) has not, so far, had any effect upon the market. The quotations are: Ell 8s. 9d. to 10s. 9d., splint 9s. 6d. to 9s. 9d., and steam 9s. to 9s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 315,354 tons—an increase of 3790 tons upon the previous week, and of 8668 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,719,743 tons—an increase of 266,753 tons upon the corresponding period.

Lighting of South Dublin Union.—A short time ago, the South Dublin Board of Guardians decided, in spite of strong opposition, to light the Union by gas; and seemingly the defeat has been taken badly by the electricity partisans, who called a special meeting last week to take into consideration "the injustice about to be done to the ratepayers by the adoption of a resolution by the Board of Guardians on April 14, 1909, whereby it was resolved to accept the offer of the Gas Company for the supply of gas for lighting purposes of the Union premises at a cost of £1142, *plus* £394 for fittings, for one year." The Chairman (Mr. J. Scully, J.P.) said the matter had been fully discussed, and was finally decided when over two-thirds of the entire Board were present—the voting being 33 to 22. He refused to permit any further discussion of the subject; and, declaring the meeting adjourned, left the room. A new Chairman was thereupon selected, and the ten members present proceeded to rescind the resolution giving the contract to the Gas Company, and to accept an offer of the Ampere Electrical Company to carry out the lighting; the Clerk expressing the opinion that they were quite in order.

Tarapaca Water-Works Company, Limited.—The twenty-first annual general meeting of the Company was held on the 3rd inst., under the presidency of Sir Robert Harvey. In moving the adoption of the report, which was noticed in the "JOURNAL" for the 27th ult. (p. 249), he pointed out that there was a reserve fund of £80,000, which had been built up to make the return of £2 per share in reduction of capital. They had as against it, and the £20,000 further added on Dec. 31, upwards of £100,000 in investments, cash, and bills. In conformity with the policy laid before the shareholders, the Directors had placed out of the profits a further £20,000 to the reserve fund to form a nucleus for a further return of capital when a sufficient amount had been accumulated. The water sales showed about 6 million gallons increase. They supplied during the year 139 million gallons in all, and they were very well satisfied with the way in which the mains and storage-tanks carried these large quantities of water. The report was adopted.

A Challenge at Ilfracombe.—In the "JOURNAL" a fortnight ago, it was stated that, in view of assertions which had been made as to advantages in point of price of the new metallic filament lamps over gas, Mr. L. Fletcher had issued, on behalf of the Welsbach Company, a challenge to the Electric Light Company to put the matter to the proof on conditions which were set forth. The suggestion was that two precisely similar houses should be installed, one with electricity the other with gas. In his reply to the challenge, Mr. H. J. F. Stewart, the Engineer of the Electric Light Company, says he would like to know how it was proposed to find two houses in which the test could take place that were precisely similar in every way. After referring to the challenge as one which "any lighting expert knows to be played out and absurd," he continues: "The proof that electricity in conjunction with certain metallic filament lamps in most cases is cheaper than gas is that we have been, and are, installing the electric light in a large number of houses in this town at fixed charges per annum, which are below the gas bills for past years, without in any way taking into consideration the undisputed advantages of the electric light." This is the challenge to a direct comparison evaded.

Truro Water Supply.—In view of representations made by the Corporation, the Truro Water Company took steps to have the purity of the water supply tested. Samples were submitted to Sir William Crookes; and his report was submitted to a meeting of the City Council last Tuesday. Sir William said that from an organic point of view the water was excellent, but the bacteriological analysis did not show such good results. It was a strange fact that the water taken from the mains was superior to that drawn from the filtered water tanks at the works. This showed that the filtering plant was not working satisfactorily, or that some parts of it were not properly cleaned. The plant should be thoroughly inspected, and the collecting-ground should be examined to see if it was possible to remove any existing cause of contamination. Personally, he did not think it was necessary to have the water boiled; but he hesitated to advise the Council to have the notices as to this withdrawn. The Water Company, in a letter accompanying the report, suggested that the Corporation should withdraw the notices recommending consumers to boil the water. The Council decided not to take this step, and asked for assurances from the Company that they will carry into effect the recommendations of Sir William Crookes.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 433.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17½–18	..	5 11 1
298,955	10	"	7	Do. 7 p.c.	12½–12¾	..	5 9 10
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	Oct. 29	6½	Bombay, Ltd.	5¾–6	..	5 8 4
40,000	5	"	6½	Do. New, £4 paid	4¼–4½	..	5 15 6
50,000	10	Feb. 25	14	Bourne- 10 p.c.	28½–29½	..	4 14 11
51,810	10	"	7	mouth Gas B 7 p.c.	16½–17	..	4 2 4
53,200	10	"	6	and Water Pref. 6 p.c.	15⅝–15⅞	..	3 15 7
380,000	Stk.	"	12½	Brentford Consolidated	249–251	+1	4 19 7
300,000	"	"	5¾	Do. New	189–191	+1	4 19 6
50,000	"	"	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	"	Dec. 11	4	Do. 4 p.c. Deb.	101–103	..	3 17 8
220,000	Stk	Mar. 12	10¾	Brighton & Hove Orig.	212–214	+1	5 0 6
246,320	"	"	7½	Do. A Ord. Stk.	154–156	+1	4 19 4
460,000	20	Apl. 16	10	British	42¾–43¼	+¼	4 12 6
109,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	116–118	+1	5 1 8
165,700	"	"	4½	Do. do. 3½ p.c.	86–88	+1	5 2 3
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13¼–13⅜*	..	5 1 10
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4¼–5	–¼	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅜–6	+¼	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 5
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77–79	..	5 13 11
157,152	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅛	Commercial 4 p.c. Stk.	108–110	..	4 14 6
560,000	"	"	5	Do. 3½ p.c. do.	102–104	..	4 16 2
475,000	"	Dec. 11	3	Do. 3 p.c. Deb. Stk.	82–84	..	3 11 5
800,000	Stk.	"	6½	Continental Union, Ltd.	99–101	..	6 8 9
200,000	"	"	7	Do. 7 p.c. Pref.	139–141	..	4 19 3
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	"	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	"	Mar. 31	5	East Hull 5 p.c. Ord.	97–99	..	5 1 0
486,692	10	Jan. 28	12	European, Ltd.	23¾–24¼	..	4 19 0
354,660	10	"	14	Do. £7 10s. paid.	17⅞–18¼	..	4 18 5
15,161,545	Stk.	Feb. 11	4/10/8	Gas 4 p.c. Ord.	103–104	..	4 7 0
2,600,000	"	"	3½	light 3½ p.c. max.	88–89	..	3 18 8
3,799,735	"	"	4	and 4 p.c. Con. Pref.	105–107	..	3 14 9
4,193,975	"	Dec. 11	3	Coke 3 p.c. Con. Deb.	85–86	..	3 9 9
258,740	Stk.	Mar. 12	4½	Hastings & St. L. 3½ p.c.	93–95	..	5 0 0
82,500	"	"	6¼	Do. do. 5 p.c.	118–120	..	5 4 2
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17⅛–18	+⅛	6 2 3
123,500	Stk.	Mar. 12	6½	Ilford "A" and "C"	134–136	..	4 15 7
65,782	"	"	5	Do. "B"	103–105	..	4 15 3
63,000	"	Dec. 30	4	Do. 4 p.c. Deb.	102–104	..	3 16 11
4,940,000	Stk.	May 13	8	Imperial Continental	182–184*	+1	4 7 0
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	120–122	+3	4 18 4

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Feb. 25	10	Liverpool United A.	225–227	..	4 8 1
718,100	"	"	7	Do. B	168–170	..	4 2 4
306,083	"	Dec. 30	4	Do. Deb. Stk.	105–107	..	3 14 9
75,000	5	Dec. 11	6	Malta & Mediterranean	4⅞–5	..	6 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	"	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 13	3½	Monte Video, Ltd.	12⅞–13	+¼	5 7 8
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G'tesh'd Con.	106⅝–107½	..	4 3 9
518,795	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19½–20	..	5 0 0
55,940	10	"	7	Do. 7 p.c.	13–13⅛	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	137–139	..	5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.	6–6¼	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	137–139	..	4 19 0
60,000	50	"	13	Do. B.	129–131	..	4 19 3
100,000	50	"	12	Do. C.	119–121	..	4 19 2
114,800	50	"	10	Do. D and E.	101–103	..	4 17 1
398,490	5	May 13	7	Primitiva Ord.	6⅞–7⅛	..	5 0 0
796,980	5	Jan. 28	5	Do. 5 p.c Pref.	5⅛–5⅜	..	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
1,000,000	10	Apl. 29	8	River Plate Ord.	14½–15	+¼	5 6 8
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd.	13¾–14¼	+¼	5 12 3
62,500	10	"	—	Do. 6 p.c. Pref.	11¾–12	..	5 0 0
125,020	50	Jan. 2	5	Do. 5 p.c. Deb.	50⅜–51⅛	..	4 17 1
135,000	Stk.	Mar. 12	10	Sheffield A	236–238	..	4 4 0
209,984	"	"	10	Do. B	233–235	..	4 5 1
523,500	"	"	10	Do. C	233–235	..	4 5 1
70,000	10	Oct. 29	10	South African	14–14½	..	6 17 11
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	123–125	..	4 5 4
1,895,445	"	Jan 14	3	Do. 3 p.c. Deb.	85–86	..	3 9 9
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.	152–154	..	5 3 11
605,000	Stk.	Feb. 25	5½	S'th Suburb'n Ord. 5 p.c.	120–122	..	4 10 2
60,000	"	"	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
117,058	"	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124–126	..	3 19 4
502,310	Stk.	May 13	5	Southampton Ord.	107–109*	+½	4 11 9
120,000	Stk.	Feb. 25	6½	Tottenham A 5 p.c.	132–134	..	5 0 9
423,940	"	"	5½	and B 3½ p.c.	110–112	..	4 13 9
149,470	"	Dec. 30	4	Edmonton 4 p.c. Deb.	101–103	..	3 17 8
182,320	10	"	8	Tuscan, Ltd.	8⅝–9⅛	..	8 13 0
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.	101–103	..	4 17 1
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105–107	..	4 13 6
255,626	Stk.	Feb. 25	6½	Wands- B 3½ p.c.	139–141	+8	4 12 2
79,416	"	Dec. 30	3	worth 3 p.c. Deb. Stk.	72–74	..	4 1 1
895,872	"	Feb. 25	5½	West Ham 5 p.c. Ord.	119–121	..	4 6 9
210,000	"	"	5	Do. 5 p.c. Pref.	125–127	..	3 18 9
253,300	"	Dec. 30	4	Do. 4 p.c. Deb. Stk.	107–109	..	3 13 5

Prices marked * are "Ex div."

Reinstatement of Pavements in Westminster.

At the meeting of the Westminster City Council last Thursday, the Works Committee reported with reference to the conference with the various gas, electric, and other companies having statutory powers in the borough, on the subject of reinstatement after digging trenches. The conference was held in October; and the decisions of the Council with reference to it were arrived at in December and January. The Gaslight and Coke Company wrote, on March 9, expressing, on behalf of the various companies represented at the conference, appreciation of the friendly spirit in which they had been met in this matter, and stating that, with one or two exceptions, the proposals of the Council were agreed to. The first exception related to "splaying back" concrete. In this matter the companies felt that their contention for a 3-inch instead of the 4½-inch splay on each side, as offered by the Council, was perfectly fair and reasonable; and it was accepted by practically every other Metropolitan Borough Council. The second exception related to the use of steam-rollers on every small road repair. The companies contended that such a proceeding was altogether unnecessary and unduly costly; and that the need (if any) for the use of a steam-roller must arise shortly after the filling in, and not when there was an accumulation of small trenches which must by then have become consolidated by the ordinary traffic. On this point, it was asked if the Council had fixed any limit of time within which the roller should be employed on such trenches; and, if so, what the limit was. The companies hoped the Council would reconsider these points. On the subject of burying mains in concrete, the companies regretted that there seemed to be no likelihood of agreement between themselves and the Council; and the point would have to be settled by friendly action at the first opportunity. On the matter of "splaying back" concrete, the committee stated that the Council had already reduced the width of the splay from 6 inches to 4½ inches on each side; and they could not suggest any further reduction. As to steam-rolling, they reported that in every case of macadam repair in Westminster the road was consolidated by steam-rolling; and the City Engineer did not advise any departure from this rule in the case of reinstatement after trenches. The Committee further pointed out that the area of macadam roadway in Westminster was small compared with the area of paved roadway; and the tendency was for the Council to diminish it. They were, therefore, unable to recommend the Council to make any alteration in their present practice with regard to the use of the steam-roller; and they suggested that the Council should reply to the letter from the Gaslight and Coke Company in accordance with their report. This was agreed to.

The Health Committee of the Wrexham Town Council have had before them a complaint from a resident of a "horrible stench" which was alleged to come from the sulphate of ammonia plant at the gas-works. The Sanitary Inspector stated, however, that the works had been visited on several occasions; and nothing offensive had been found there. It was decided to forward the complaint to the Gas Company for their observations.

Warrington Water Supply.—Owing to increasing demands, some difficulty has been experienced by the Warrington Corporation in so distributing their plentiful supply of water as to meet all needs. The Water Committee have accordingly had under consideration proposals for dealing with the difficulty, and in conjunction with their Engineer (Mr. J. Deas) have prepared a scheme which has been submitted to a special meeting of the General Purposes Committee. This comprises the laying of a 24-inch main from the Winwick Pumping-Station, additional pumping plant at the Houghton Green Station, and further high-level works consisting of two triple-expansion engines each capable of delivering 750,000 gallons of water per 24 hours, a water-tower of a capacity of 300,000 gallons, and some distributing mains.

Public Lighting in Westminster.—At the meeting of the Westminster City Council last Thursday, the Works Committee reported on a number of contracts between the Gaslight and Coke Company and the Council for public lighting, which expire at various periods between the latter part of the present year and the end of 1910. The Committee stated that they proposed to consider the advisability of negotiating terms for a new contract covering all the public gas lighting now undertaken by the Company. In the meantime, they had instructed the Town Clerk to negotiate with the Company for all their contracts with the Council for public lighting to be terminated at one time. They recommended the Council to give notice to the Gas Company to terminate the contracts in reference to the lighting in the parishes of St. Martin, St. Margaret, and St. John, and in Parliament Street and Whitehall, at their expiry on Dec. 31 next. This was agreed to.

Suicides by Coal Gas.—Twice within a week the Coroner for Folkestone (Mr. G. W. Haines) held inquests on women who ended their lives by placing their heads in gas-ovens. The first case was that of the wife of a Hastings grocer, named Isabel White. It was stated that the deceased woman, who had shown symptoms of mental derangement, was discovered at the house of her brother-in-law with her head in a gas-oven, over which was placed a sheet. The gas was turned on, and the woman had been suffocated by the fumes. A verdict of "Suicide while temporarily insane" was recorded. In the second case, the subject of the inquiry was Elizabeth Jane Andrews, aged 63, who was found by her husband on the previous day with her head in the gas-oven. She had stopped up the principal air apertures, and had also placed on the edge of the stove a kind of pillow, on which it is presumed she had rested her head. A verdict was returned of "Suicide from gas poisoning while in an unsound state of mind." Last Thursday, Dr. Ambrose held an inquest on Mrs. Sarah Ann Boardman, 61, the wife of an engine fitter at Leyton. The husband deposed that his wife had lately given way to drink; and on the previous Sunday she was ill and did not have any dinner. In the afternoon he went upstairs to lie down, and when he returned at about six o'clock, he discovered his wife with her head in the gas-oven. His overcoat was wrapped round her, and the gas-taps were turned on. A medical man gave evidence to the effect that death was due to suffocation from gas poisoning; and a verdict of "Suicide" was returned.

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Public Lighting of Chichester.—The Chichester Town Council have adopted a recommendation of the Lighting, &c., Committee to accept the Gas Company's tender for lighting the streets and public places in the city for five years from the expiration of the present contract at the end of this year. The contract is to be determinable at the option of the Corporation at the end of the first or third year, on giving six months' notice; and the price is to be £3 10s. per lamp.

A Father's Desperate Deed at Conisborough.—Driven desperate by family bereavements and want of work, a Conisborough miner named George Brown, and aged 46, last Saturday morning cut his throat and attempted to kill his eight children by turning on the gas-taps in the house. The man himself was dead when the police arrived; but fortunately the children's lives were saved—their escape being put downto the fact that the flow of gas, after going on for some time, was automatically cut off by the penny-in-the-slot meter.

Manchester's Increasing Water Consumption.—The increasing consumption of water in the area supplied by the Manchester Corporation is causing some anxiety to the Water Committee. It was stated at last Thursday's meeting of the Committee that the consumption for the three previous days had been at the rate of 46,000,000 gallons per diem, compared with 43,000,000 gallons at the corresponding period of last year. Members of the Committee are satisfied that there must be a considerable waste, apart from the legitimate increased demand upon the department; and it was decided that precautions be taken to prevent this as far as possible. Basing the average daily consumption on 41,000,000 gallons, the Corporation have at present in stock 125 days' supply.

A Shocking Affair at Hackney.—An explosion of gas, by which six persons—three police constables and three civilians—were seriously injured took place early on Sunday morning in Guinness's Trust Buildings, Hackney Road. Mrs. Dillon, the wife of the tenant of the room where the accident occurred, on returning home, could not gain admission; and so summoned assistance. It was when the helpers forced the door that the explosion occurred, which caused so much personal injury. Though the explosion was an accident, it is to be feared that the escape of gas was wilfully caused; for the supply-pipe at the meter had been severed with a hammer and chisel, which were found on the table, while the tenant was dead on the bed, which he had previously pushed up against the door to make entry more difficult. The sad old explanation of straitened circumstances, owing to lack of regular employment, is put forward as the reason of the suicide.

The brilliant illumination of the New Savoy Hotel at Newport, we learn, attracted a considerable crowd, and aroused favourable comment in the neighbourhood of the station approach last Thursday. The whole of the lighting of the establishment is effected by an installation of high-pressure incandescent gas, which has been furnished throughout by the Newport Gas Company. Gas is also used for the whole of the cooking and heating apparatus.

We have received from the Davis Gas-Stove Company, of Luton, a copy of their new summer booklet for 1909, which illustrates the firm's cookers, steamless radiators, water-heaters, and other domestic appliances for use in connection with gas. The "New Davis" screwless cooker first attracts attention; and there is also described a new series of high-grade cookers introduced this season for the first time. This series consists of four sizes; and an important feature of the stoves is that, in designing them, every effort has been put forth to make all the details as perfect as possible from a maintenance point of view.

Messrs. John Wright and Co., of Birmingham, are performing a useful service to the industry generally, as well as to themselves, by producing and circulating among architects a pamphlet written with the view of bringing to their notice the advantages of gas for heating purposes. Under the title of "Domestic Heating—the Warming and Ventilation of Dwelling-Houses," facts and arguments are set forth which should convince even the most sceptical as to the soundness of the claims of gas in this connection. The type employed is large, and the lines are well spaced; while the pamphlet is not too long to hold the interest of the reader.

The Ammanford Urban District Council have been congratulating themselves on the settlement arrived at in connection with the Gas Bill. The Chairman (Mr. W. Evans) said they would be able to have gas for the streets at 3s. 5d. per 1000 cubic feet. The Clerk explained that the Council would benefit by a rebate of 20 per cent. as compared with private consumers. Mr. Roblings remarked that 3s. 9d. was the price fixed, subject to revision. They had tried to get a 4s. maximum for private consumers; and they had actually obtained 4s. 3d. With a rebate of 20 per cent., the Council's maximum would only be 3s. 5d. per 1000 cubic feet. Colonel Morris pointed out that, though this was a good thing for private consumers, it had come too late for the Council, who had already entered into a contract for street lighting.

The report to be submitted at the meeting of Meters Limited, next Tuesday, states that the trading for the year to March 31 has resulted in a gross profit of £32,006, which is reduced by general management expenses, Directors' fees, legal charges, expenses on patents, income-tax, and depreciation of buildings, machinery, and plant. A sum of £3615 has been spent out of revenue on repairs and renewals. After providing for interest on debenture stock £5627, the net profit amounts to £21,545, which, with £2759 brought forward, makes £24,304, out of which interim dividends at the rate of 5½ per cent. per annum upon the preference shares and at the rate of 4 per cent. per annum upon the ordinary shares were paid in November last. The Directors now recommend the payment of further dividends at the rate of 5½ per cent. per annum upon the preference shares and at the rate of 8 per cent. per annum upon the ordinary shares (making the ordinary dividend 6 per cent. for the year); that £5000 be added to reserve fund (making this fund £60,000); and that the balance of £2762 be carried forward to the next accounts.

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The annual report of Messrs. Fletcher, Russell, and Co., of Warrington, shows that the net profit, after payment of debenture interest, &c., is £3673. The amount brought forward was £290; and £5000 has been transferred from the reserve fund. The dividend on the 6 per cent. preference shares absorbs £3000. It is now proposed to declare a final dividend on the ordinary shares at the rate of 5 per cent.; an interim dividend at the same rate having been paid for the half year ending August. This will leave £964 to be carried to next year's account.

The Cockermouth Gas Committee, after having considered the question of expense involved in supplying gas to very small consumers, recommended that new consumers using less than 20s. worth of gas per annum be charged the yearly sum of 2s. towards the cost of installation. It was explained that some consumers, after having had an installation at a cost of £2 10s., only used 7s. 6d. worth of gas per annum. One member of the Council opposed the minute on the ground that small consumers would be penalized; and, on a vote being taken, it was resolved to delete the recommendation.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHEMIST (ONE MONTH). No. 5094.
CLERK. No. 5095.
DRAUGHTSMEN. Newton, Chambers, and Co., Sheffield.
GAS-WORKS ASSISTANT. No. 5096. Applications by May 25.

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PURIFIERS, &c. Sutton Gas Company.
PURIFIERS, &c. E st Ardsley Gas-Works.
PURIFIERS AND STATION METER, &c. Solihull Gas Company.
SULPHATE PLANT. Greenock Gas Department. Tenders by May 24.

Stocks and Shares.

BEXHILL WATER AND GAS COMPANY. June 9.
EAST HULL GAS COMPANY. June 2.

TENDERS FOR

Coal and Cannel.

BARNOLDSWICK GAS AND WATER DEPARTMENT. Tenders by June 1.
BOLTON GAS DEPARTMENT. Tenders by May 28.
BRIGHOUSE GAS DEPARTMENT. Tenders by May 29.
BUXTON GAS DEPARTMENT. Tenders by May 29.
CIRENCESTER GAS COMPANY. Tenders by May 31.
CLITHEROE GAS DEPARTMENT. Tenders by May 22.
COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.
DENBIGH GAS AND WATER COMPANIES. Tenders by June 3.
EAST DEREHAM URBAN DISTRICT COUNCIL. Tenders by June 1.
ELSECAR, &c., GAS COMPANY. Tenders by June 2.
EXMOUTH GAS COMPANY. Tenders by May 27.
GLOUCESTER GASLIGHT COMPANY. Tenders by June 1.
ROCHESTER, &c., GAS COMPANY. Tenders by May 26.
SEDGLEY URBAN DISTRICT COUNCIL. Tenders by May 31.
SHREWSBURY GASLIGHT COMPANY. Tenders by May 22.
TEIGNMOUTH GAS DEPARTMENT. Tenders by May 31.
TIVERTON LIGHTING COMMITTEE. Tenders by June 4.
TORQUAY GAS DEPARTMENT. Tenders by May 24.
WHITTINGTON GAS COMPANY. Tenders by May 22.

Conveying and Elevating Machinery, &c.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by May 25.

Fire-Clay Goods.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.

General Stores—Lime, Iron and Steel, Lead, Compo., Lead Pipe, Oils, Paints, Castings, Ironmongery, &c.

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BURTON-ON-TRENT GAS DEPARTMENT. Tenders by May 26.
COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.

Incandescent Goods.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.

Meters.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.

Pipes, &c.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.
WOMBWELL GAS AND WATER DEPARTMENT. Tenders by May 26.

Purifiers.

TEIGNMOUTH URBAN DISTRICT COUNCIL. Tenders by May 31.

Retort-House and Retort-Bench.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by May 25.

Tar and Liquor.

BURTON-ON-TRENT GAS DEPARTMENT. Tenders by May 26.
BUXTON GAS DEPARTMENT. Tenders by May 29.

Valves, Brass and Slot Fittings, Taps, &c.

COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by May 27.

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TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. Wilson, Pleasant Grove, York Road, King's Cross, London, N.

ROBERT B. FITZMAURICE,
4, EAST INDIA AVENUE,
LEADENHALL STREET, LONDON.
Telegraphic Address: "Fitzmaurice, London." Telephone: No. 11,113 Central.
Established 1887.
Advertiser, who is Shipping Agent to several Gas Companies, Municipalities, and Gas Material Makers, would be glad to undertake SHIPMENT OF GOODS ordered by Colonial Gas-Works or Others.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, Exchange Street, Manchester, and 11, Old Hall Street, Liverpool.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

SULPHURIC ACID.
SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

TAR WANTED.
National Telephone 7002. Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

KINGS Patent Agency, Limited, 165, Queen Victoria Street, London, E.C. Director Benj. T. King, A.I.M.E., British Chartered Patent Agent (Regd. by Exam.). Telep. 632 Central. Teleg. "Geologic," London. We sustain over quarter of a century's Experience and Reputation for Patenting Inventions and Registering Trade Marks throughout the World.
Write or call. We attend and advise you free.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

AMMONIA.
Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 23, College Hill, London, E.C., and 25, Bridge End, Leeds.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
Read Holliday and Sons, Ltd., Huddersfield.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, May 11, p. I. of Centre.
Pinchbeck Limited, Adams Place, George's Road, Holloway, N.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 477.
Friedrich Lux, Ludwigshafen-am-Rhein.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
Brotherton and Co., Ltd., Chemical Manufacturers, Works: Birmingham, Leeds, Wakefield, and Sunderland.

FRASER'S FIRE CEMENT.
FOR Gas-Works, Retort Settings, &c. Supplied to the Largest Works in the Kingdom.
A. C. Fraser's Fire Cement Co., Corbett Street, Bradford, Manchester.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "Enamel." National Telephone 1759.

DELLWIK-FLEISCHER WATER GAS.
BLUE WATER GAS, CARBURETTED WATER GAS, SELF-CARBURETTING.
FOR Particulars of Annual Generating Capacity of Plants built or in course of construction, see Advertisement in the "Journal" for May 4, p. 273.
The Dellwik-Fleischer Water Gas Syndicate, 25, Victoria Street, Westminster, London, S.W. Telegraphic Address "Dellwik, London."

TO GAS ENGINEERS AND MANAGERS.
THERE will shortly be announced in the "JOURNAL" Particulars of a NEW BURNER for STREET LIGHTING, which will be known as the TWIN-LIGHT. There has never been anything to approach it in Efficiency; and we would like all those interested in Public Lighting to look out for the Announcement mentioned.

GAS TAR wanted.
Brotherton and Co., Ltd., Tar Distillers, Works: Birmingham, Glasgow, Leeds, Liverpool, Wakefield, and Sunderland.

STAINES AND EGHAM GAS COMPANY.
APPLICANTS for the Post of Main- TENANCE INSPECTOR are THANKED, and Informed that the Position HAS NOW BEEN FILLED.
May 14, 1909.

ADVERTISER (Age 25), son of a well- known Gas Engineer, desires Situation as MANAGER of small Works, or ASSISTANT on large. Five Years' Practical Experience of Gas Manufacture and Distribution. Two Years Retort Setting. Competent Draughtsman, Chemist, and Book-Keeper. Excellent Testimonials. Disengaged.
Address Jas. R. Love, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE UNIVERSITY OF LEEDS.
(Department of Fuel and Gas Engineering.)
RESEARCH FELLOWSHIP.
APPLICATIONS are invited, up to May 28, for an OPEN FELLOWSHIP of £100 per Annum, established by the Institution of Gas Engineers for the Encouragement of Research in the Chemistry of Gases and Combustion.
For further Particulars, Apply to the Registrar.

WANTED, a Chemist for One Month.
Must be capable of Thoroughly Analyzing in Detail Coal Gas.
Apply, by letter, to No. 5094, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Gas-Works Assistant.
Must be Technically Trained, able to Draw, and to make Usual Chemical Tests, &c. Age 21 to 25. Works' make, about 240 Millions.
Applications, with Particulars of Qualifications, Experience, and Two Testimonials (*copies* only) to be sent not later than the 25th of May, to No. 5096, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, immediately, One or Two DRAUGHTSMEN accustomed to Gas-Works Plant, Elevators and Conveyors, and Constructional Steel Work.
Apply, by letter, endorsed "Draughtsman," Stating Age, Salary required, and Experience, to Messrs. Newton, Chambers, and Co., Ltd., Thorncliffe Iron-Works, Sheffield.

GAS-WORKS CLERK, NORFOLK COAST.
WANTED, a Respectable Young Man of Good Address (Age about 20 Years), for Ledgers, Wages, Residuals, Stores, General Booking, and Analyses. Must be persistently Energetic, Quick, and Accurate. Some knowledge of Gas-Works and Simple Chemical Tests desirable. Hours 8.30 to 5.30.
Apply, in own Hand-Writing, Stating fully Experience, Personal and General Particulars, and Wages required, to No. 5095, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE, at the East Ardsley Gas- Works, Four 8-Feet PURIFIERS, 4-Feet Deep, with Hydraulic Eight-Way Centre Valve. In Good Condition.
For Price and further Particulars, Apply to Tom Broadhead, Secretary, Bond Street, Dewsbury.

FOR SALE—Three Purifiers, by Newton, Chambers, and Co., 20 ft. square by 5 ft. deep, Planed Joints, 18-inch Valves and Connections, with Bye-Passes, Travelling and Lifting Gear. In Good Condition. Being Removed for Extension.
Apply to the Secretary, Gas Office, Sutton, Surrey.

FOR SALE—Four 8-feet Square by 4 ft. 6 in. deep PURIFIERS, with 8-inch diameter Valves and Connections, and Lifting Gear; also STATION METER, with 6-inch diameter Valves and Connections. All in good condition. Replaced by larger Plant.
Apply to the Manager, Gas Company, Solihull, Birmingham.

FOR SALE, Cheap, the undermentioned GAS PLANT:—
Kirkham's "STANDARD" WASHER-SCRUBBER to pass 250,000 cubic Feet per diem.
GASHOLDER, 3-Lift, 50 ft. dia., cap. 128,000 c.f.
EXHAUSTERS, 10,000 and 8000 cub. ft. per Hour.
4-inch Cast-Iron Vertical CONDENSER.
Wrought-Iron SCRUBBER, 9 ft. high by 3 ft.
Donkin's VALVES, 12-inch, 10-inch, 6-inch.
Apply to Samuel White and Son, 60, Queen Victoria Street, London, E.C.

THE Coventry Corporation Gas Depart ment have FOR SALE about 170 WESTERN GAS-COOKERS, made by the Davis Gas Stove Company. These are excellent Gas-Cookers for Slot Consumers and are only offered for Sale because of being replaced by larger Cookers. They have been thoroughly Repaired, Cleaned, and Renovated, and supplied with New Grill Pans and Grids.
Price 12s. each, f.o.r. Coventry.
Fletcher W. Stevenson,
Engineer and General Manager.
Gas-Works, Coventry,
April, 1909.

CORPORATION OF GREENOCK.

(Gas Department.)

TENDERS wanted for the Purchase and Removal of SULPHATE of AMMONIA PLANT, making about 30 cwt. per Twenty-Four Hours (Dempster's Still), which is being replaced by larger Plant. Plant can be seen at above Works.

Any further Information can be had from Mr. James McLeod, Gas Manager.

Offers to be in by May 24, 1909.

Inchgreen Gas-Works,
Greenock, May 11, 1909.

BARNOLDSWICK URBAN DISTRICT COUNCIL.

(Gas and Water Department.)

THE above Council invite Tenders for the Supply of 4500 Tons of Screened GAS COAL or NUTS for the Year ending June 30, 1910.

The Council reserve the right to Divide the Quantity between Two or more Contractors.

The Council do not bind themselves to accept the lowest or any Tender.

Form of Tender supplied.

Tenders to be on the prescribed Forms, and addressed to the Chairman, Gas Committee, Town Hall, Barnoldswick, and delivered not later than June 1, 1909.

J. W. Thompson,
Engineer and Manager.

Town Hall, Barnoldswick.

DENBIGH GAS AND WATER COMPANIES.

TENDERS are invited for the Supply and Delivery, at Denbigh Station, of 1600 Tons of Well-Screened GAS COAL, as required, from the 1st of July, 1909, to June 30, 1910; also for about 80 Tons of Washed ANTHRACITE PEAS, ¾-inch to ⅜-inch, free from Dust, as required, from the 1st of September, 1909, to the 31st of August, 1910.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, addressed to the undersigned, must be sent before the 3rd of June next.

W. Ewart Brock,
Manager and Secretary.

Gas-Works, Denbigh,
May, 15, 1909.

BOROUGH OF TORQUAY.

THE Gas-Works Committee of the Torquay Town Council are prepared to receive TENDERS for the Supply of 2000 to 3000 Tons of approved GAS COAL, delivered free into Stores at St. Mary Church Gas-Works.

Further Particulars and Forms on which Tenders must be submitted may be obtained at my Office, Town Hall, Torquay.

Sealed Tenders, endorsed "Tender for Coal," to be sent to the undersigned not later than Noon on Monday, May 24, 1909.

The lowest or any Tender will not necessarily be accepted.

Fredk. S. Hex,
Town Clerk.

Town Hall, Torquay,
May 8, 1909.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas- light Company invite TENDERS for the Supply of about 19,000 Tons of Screened GAS COALS, to be delivered free at the Great Western or London and North Western Goods Yard, Shrewsbury, during the Year commencing July 1, 1909, and ending June 30, 1910.

The Directors reserve to themselves the right to divide the Quantity into Two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on Forms (containing further Particulars) which may be obtained on Application at the Company's Works or by post, and must be sent to the undersigned on or before the 22nd day of May, 1909.

By order,
Wm. Belton, A.M.I.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
April 24, 1909.

BUXTON URBAN DISTRICT COUNCIL.

(Gas Department.)

THE Gas Committee invite Tenders for:—

(1)—GAS COAL, NUTS, and CANNEL.

The Supply of 6000 Tons of Best Screened GAS COAL or NUTS, and 3000 Tons of CANNEL, to be delivered as required, at the Gas Siding, Midland Railway, Buxton, during the Twelve Months ending July 31, 1910, in accordance with the Specification and Conditions, which may be obtained from the Gas Engineer, Mr. H. Barker, Town Hall, Buxton.

Sealed Tenders, endorsed "Coal" and "Cannel" respectively, are to be delivered to the undersigned on or before Saturday, the 29th inst.

The Committee do not bind themselves to accept the lowest Tender, and reserve the right to divide the Contract.

(2)—SURPLUS TAR and AMMONIACAL LIQUOR.

The Purchase of the Surplus TAR and the whole of the AMMONIACAL LIQUOR which may be produced at the Buxton Gas-Works during the Twelve Months ending June 30, 1910. The same to be delivered into Contractor's Tanks at the Gas Siding, Midland Railway, Buxton.

Sealed Tenders, endorsed "Tar" and "Liquor" respectively, are to be delivered to the undersigned on or before Saturday, the 29th inst.

Forms of Tender may be obtained on Application to the Gas Engineer.

By order of the Committee,
(Signed) Josiah Taylor,
Clerk.

Town Hall, Buxton,
May 13, 1909.

THE East Dereham Urban District Council are prepared to receive TENDERS for the Supply of about 1700 Tons of Screened GAS COAL, for the ensuing Year.

Conditions and Forms of Tender to be had of the undersigned.

Tenders, marked "Coals," to be sent in by Ten a.m. on the 1st of June, 1909, to

B. H. Vores,
Clerk to the Urban District Council.

East Dereham,
May 8, 1909.

CIRENCESTER GAS COMPANY, LIMITED.

TENDER FOR GAS COAL.

THE Directors are prepared to receive TENDERS for the Supply, during the Twelve Months commencing July 1 next, of about 5000 Tons of GAS COAL, delivered at the Watermoor Station of the Midland and South Western Junction Railway Company at such times and in such Quantities as required by the Manager.

Tenders, Forms for which will be sent on Application, to be forwarded to the undersigned not later than May 31.

John P. Beecham,
Secretary.

12, Silver Street, Cirencester,
May 4, 1909.

BOROUGH OF BRIGHOUSE.

GAS COAL, &c.

THE Gas Committee are prepared to re- ceive TENDERS for the Supply and Delivery of GAS COAL, Screened NUTS and Buxton LIME required by them during the Year ending June 30, 1910.

Specification and Form of Tender can be obtained on Application to the Gas Engineer's Office, Mill Lane, Brighouse.

Sealed Tenders to be sent in, addressed to the Town Clerk, Municipal Offices, Brighouse, on or before Saturday, the 29th of May, 1909, endorsed on the outside "Tender for Coal," or "Lime," as the case may be.

James Parkinson,
Town Clerk.

Town Clerk's Office,
Brighouse, May 10, 1909.

SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSION.

PERSONS desirous of Tendering for the Construction of RETORT-HOUSE, RETORT-BENCH, COAL ELEVATOR AND CONVEYOR, HOPPERS, &c., in Connection with the above, are requested to send their names and addresses to Messrs. Corbet Woodall and Son, Palace Chambers, Bridge Street, Westminster, S.W., together with a Deposit of £3 3s. for Copies of Drawings, Specification, and Form of Tender. The Deposit will be returned on receipt of a *bond-fide* Tender.

Tenders must be delivered to the undersigned not later than Five p.m. on Tuesday, May 25.

The lowest or any Tender will not necessarily be accepted.

By order,
John D. Fidler,
Clerk to the Council.

Council Offices,
Sutton-in-Ashfield.

EXMOUTH GAS COMPANY.

THE Directors of the Exmouth Gas Company invite TENDERS for the Supply of about 6000 Tons of Best GAS COAL (Screened or Unscreened), to be delivered in such quantities and at such times as may be required from the 1st of August, 1909, to the 31st of August, 1910, and to weigh 20 cwt. to the Ton over the Gas Company's or Dock Company's Weighbridge, the Coal to be Fresh Wrought, Dry, and free from Hards, Smudge, Shale, and Pyrites.

Tenders to be accompanied by Practical Working Analysis.

Prices may be quoted c.i.f. or f.o.b. (by Sailing Vessels only) Exmouth Docks, or f.o.r. Exmouth Railway Station (London & South Western Railway).

Sealed Tenders, endorsed "Tender for Coal," to be sent to the undersigned not later than Saturday, the 27th day of May, 1909.

The Directors do not bind themselves to accept the lowest or any Tender.

Special Tender Forms are not provided or required.

James T. Foster,
Secretary and Manager.

Gas-Works, Exmouth,
May 6, 1909.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the Supply of about 34,000 Tons of GAS COAL for One Year from the 1st day of July next, in such Monthly Quantities as may be required by the Company.

Tenders to State the Price Delivered at the Midland Railway Sidings, Hempsted, near Gloucester, or the Great Western Railway Wharf, Llanthony, Gloucester; or, if sent (as preferred) by Water, the price f.o.b. and also the Price Delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the Description and Quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Tuesday, the 1st day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any Quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
William E. Vinson,
Secretary.

Gas Offices, Gloucester,
May 3, 1909.

BOROUGH OF TIVERTON.

TENDERS FOR COAL.

THE Lighting Committee are prepared to receive TENDERS for the whole or part of 4000 Tons of Freshly-Wrought GAS COAL, Screened or Uncreened, including NUTS, giving Full Particulars of Coal with Analysis, and to be Delivered at the Railway Siding adjoining their Gas-Works at Tiverton during One Year, and in such Quantities as may be directed by their Manager.

Further Particulars and Form of Tender (which must be used) may be obtained on Application to Mr. Clark Jeffery, Gas Manager.

Sealed Tenders, endorsed "Tender for Gas Coal, and addressed to the undersigned, must be received on or before Friday, the 4th day of June, 1909.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
C. M. Hole,
Town Clerk.

Tiverton, May 7, 1909.

WHITTINGTON GAS COMPANY, LIMITED, NEAR CHESTERFIELD.

THE Directors of this Company are pre- pared to receive TENDERS for the Supply of 3000 Tons of Best Quality GAS COALS, from the South Yorkshire or Derbyshire Coalfields, for Twelve Months commencing July 1, 1909.

Tenders must state the name of the Pits from which the Coal will be obtained, which is to be fresh Wrought and free from Slate and other Impurities.

The Works of the Gas Company are situated on the Dunston and Barlow Siding of the Midland Railway, and the Price must include delivery free alongside.

Tenders, marked "Tender for Coal," are to be sent in the first instance to the undersigned not later than Saturday, the 22nd inst., to No. 3, Winchester Road, South Hampstead, London, N.W.

The Company do not issue any Special Form of Tender.

(Signed) S. Penny, Assoc.M.Inst.C.E.
Engineer.

BOROUGH OF BURTON-UPON-TRENT.

THE Town Council of this Borough invite TENDERS for—

LIME.

The Supply of about 100 Tons of Best Hand-Picked LIME for Purifying, to be delivered in Sender's or Railway Company's Waggons at the Gas-Works in such Quantities and at such times as may be required during the Twelve Months ending June 30, 1910.

TAR.

The Purchase of the Surplus TAR, which will be produced and delivered into the Purchaser's Tank-Waggons at the Gas-Works during the Twelve Months ending June 30, 1910.

Terms of Payment, Net Cash Monthly.

Tenders, endorsed "Lime" and "Tar" respectively, are to be delivered to the Assistant-Manager at the Gas-Works, Burton-upon-Trent, on or before Wednesday, May 26 inst.

The Council do not bind themselves to accept any Tender.

T. N. Whitehead,
Town Clerk.

Town Hall, Burton-upon-Trent,
May 14, 1909.

URBAN DISTRICT COUNCIL OF COLWYN BAY AND COLWYN.

TENDERS FOR COAL.

THE Gas Committee of the above Council invite TENDERS for the Supply of 7500 Tons, more or less, of GAS COAL (Screened or Unscreened, or Screened Nuts) required by them from the 1st of July, 1909, to the 30th of June, 1910, to be delivered free at the Colwyn Bay Gas-Works Siding in such quantities and at such times as required. Tenders to quote delivery in Council Waggons or otherwise, and must give Full Description of Coal, together with Working Analysis, &c.

Full Particulars and Form of Tender can be obtained on Application to the undersigned.

The Committee reserve to themselves the right to divide the Quantity into Two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Coal," to be sent in addressed to the undersigned not later than Thursday, the 27th day of May inst.

GENERAL STORES.

Tenders are also invited for the Supply of the following STORES and MATERIALS, in such Quantities as may be required in the Gas Department of the above Council, for the Year or period ending the 31st of March, 1910—viz.:

1. FIRE-CLAY GOODS, LIME, &c.
2. IRON TUBES and FITTINGS.
3. LEAD and COMPO.
4. IRON and STEEL.
5. OILS.
6. BRASS FITTINGS and SUNDRIES.
7. SLOT FITTINGS.
8. DRY METERS.
9. MAIN TAPS.
10. STEAM VALVES.
11. CASTINGS.
12. INCANDESCENT LIGHTING GOODS.
13. IRONMONGERY.
14. PAINTS.

Form of Tender and any Information may be had from the undersigned, to whom sealed Tenders, endorsed "Tenders for Stores," addressed to the Council Offices, Colwyn Bay, must be delivered not later than Thursday, the 27th day of May inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
James Amphlett,
Clerk to the Council.

Council Offices, Colwyn Bay,
May 14, 1909.

BOROUGH OF CLITHEROE.
(GAS DEPARTMENT.)

TENDER FOR GAS COAL.

THE Gas Committee invite Tenders for Screened GAS COAL, NUTS, and CANNEL, to be delivered on the Gas-Works Siding, during the Year ending June 30, 1910.

Particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered at my Office on or before Saturday, the 22nd of May, 1909.

ROBT. BARRETT,
Engineer and Manager.

Gas-Works, Clitheroe,
May 6, 1909.

TENDERS FOR GAS COAL.

THE Sedgley Urban District Council invite TENDERS for the Supply of 1000 Tons of GAS COAL (more or less) to be delivered at the Shut-End Siding at such times and in such Quantities as may be directed.

It is desirable that a statement of an Analysis of the Quality of a Sample of the Coal to be supplied be sent with the Tender.

Sealed Tenders, marked "Coal," must reach me not later than the 31st of May, 1909.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
THOMAS R. KNIGHT,
Clerk of the Council.

Council House, Sedgley,
May 11, 1909.

WOMBWELL URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

CAST-IRON WATER-MAINS AND SPECIALS.

THE above Council invite Tenders for the Supply and Delivery, at the Wombwell Midland Station, of about 1400 Yards of 8-inch diameter Cast-Iron WATER MAINS and SPECIALS.

Specification and Form of Tender may be had on Application to the Water-Works Engineer, Mr. P. D. Walmsley, B.Sc., at the Gas-Works, Wombwell.

Sealed Tenders, endorsed "Water-Mains," must be delivered to me the undersigned, on or before Wednesday, the 26th day of May, 1909.

PERCY MILNES WALKER,
Solicitor,
Clerk to the Council.

Town Hall, Wombwell,
May 12, 1909.

COUNTY BOROUGH OF BOLTON.

TENDERS FOR COAL.

THE Gas and Lighting Committee invite TENDERS, from Colliery Proprietors only, for the Supply of Screened and Unscreened GAS COAL, COBBLES, and NUTS required during the Year ending the 30th of June, 1910.

Specifications and Forms of Tender may be obtained on Application to Mr. Wm. Walch, Office Superintendent, Gas Offices, Bolton.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the above Committee, to be delivered at the Gas Offices, Bolton, not later than 9.30 a.m. on Friday, the 28th of May, 1909.

SAML. PARKER,
Town Clerk.

Town Hall, Bolton,
May 14, 1903.

TEIGNMOUTH URBAN DISTRICT COUNCIL.

TENDERS FOR NEW PURIFIERS.

TENDERS are invited by the above Council for the Provision and Erection of Four 16 feet Square Connectionless and Luteless PURIFIERS, fitted with Pickering's Patent Valve.

A Copy of the Drawings and Specifications may be obtained from Mr. J. Alex. Gray, the Gas Engineer, on payment of the Sum of £1 1s. which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Purifiers," and addressed to the undersigned, to be delivered at the Town Hall, Teignmouth, not later than Monday, the 31st day of May, 1909.

The Council do not bind themselves to accept the lowest or any Tender.

A. PERCIVAL DELL,
Clerk to the Council.

Town Hall, Teignmouth,
May 5, 1909.

TEIGNMOUTH URBAN DISTRICT COUNCIL.

THE Gas Department of the above Council invite TENDERS for the Supply of 3800 Tons of Good GAS COAL, Screened or Unscreened. The same to be supplied to the requirements of the Council between the 31st day of July, 1909, and the 30th day of June, 1910.

The Coal must be fresh Wrought and free from all Impurities.

No Special Tender Form will be issued.

Tenders must be accompanied by a full Description and Practical Working Analysis of the Coals quoted, and may be either f.o.b., c.i.f. Teignmouth Harbour, f.o.r. Teignmouth Railway Station, or delivered into the Gas-Works Store. Seaborne Coal to be delivered in 200-400 Ton Sailing Vessels only.

Sealed Tenders, endorsed "Gas Coals," to be addressed to A. Percival Dell, Esq., Clerk to the Council, Town Hall, Teignmouth, and delivered not later than Monday, the 31st day of May, 1909.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
J. ALEX. GRAY,
Gas Manager.

Gas-Works, Teignmouth,
May 6, 1909.

ELSECAR, WENTWORTH, AND HOYLAND GAS COMPANY.

THE Directors invite Tenders for the Supply of the whole or part of 3500 Tons of Best Screened GAS COAL or NUTS, to be delivered at Elsecar Station (Great Central Railway), during the Year ending the 30th of June, 1910, at such times and in such Quantities as may be required by the Manager.

Tenders to be delivered by the 2nd of June, addressed to the Chairman, endorsed "Tender for Coal."

ALBERT F. HALL,
Secretary.

Hoyland, near Barnsley,
May 14, 1909.

ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY.

GAS COAL.

THE Directors invite Tenders for the Supply of about 35,000 Tons of GAS COAL, to be delivered between the 1st of July, 1909, and the 30th of June, 1910.

Further Particulars, with Forms of Contract and Tender, may be had on Application; and Sealed Tenders, marked "Coal," are to be delivered to me at these Offices not later than Noon of Wednesday, the 26th of May, 1909.

J. M. VEEVERS,
Engineer and General Manager.

Gas Offices, Rochester,
May 13, 1909.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

EAST HULL GAS COMPANY.

SALE BY TENDER OF £20,000 NEW FIVE PER CENT. ORDINARY STOCK.

THE Directors Offer For Sale by Tender the above amount of STOCK, to be issued under the Provisions of the East Hull Gas Act, 1906, and the various Acts Incorporated therewith.

Since the Year 1867, the Company have paid, without intermission, the Maximum Dividend allowed by Parliament.

The Dividend is Cumulative—*i.e.*, should the Profits of the Company in any One Year be insufficient to pay the Maximum Dividend, the same may be made up out of the Reserve Fund or out of Surplus Profits in any future Year.

Any amount of Stock being a multiple of £5 but not less than £20 may be applied for.

The Stock will be allotted to the Highest Tenders.

A deposit of £10 per Cent. on the nominal amount of the Stock applied for must accompany each Tender, and the Allottees must pay the remainder of the Purchase Money on or before the 30th day of June, 1909.

Last Day for Receipt of Tenders, Wednesday, the 2nd day of June, 1909.

Forms of Tender and Particulars of Sale can be obtained at the Local Branches of Messrs. BARCLAY AND COMPANY, LIMITED, Bankers; or from the OFFICES OF THE COMPANY.

By order of the Board of Directors,
DAVID WOOD,
Secretary.

Offices: Saint Mark Street,
Hull, May 14, 1909.

BEXHILL WATER AND GAS COMPANY.

SALE BY TENDER OF NEW ORDINARY SHARES.

THE Directors give Notice, that they will be prepared to receive, not later than Twelve o'clock at Noon on Wednesday, the 9th day of June, 1909, Sealed TENDERS for 1000 NEW ORDINARY SHARES of £10 each, being the first portion of the Additional Capital the creation and issue of which was authorized under the powers of the Bexhill Water and Gas Act, 1904, by Resolution of the Extraordinary Meeting of the Shareholders of the Company held on the 29th day of September, 1908.

Shares will rank with the Existing Ordinary Shares for a Maximum Dividend of Seven per Cent.

The lowest Price at which Tenders will be accepted (which may not be less than par) will be deposited with the Board of Trade pursuant to the Act.

In the event of the receipt of Tenders at the lowest price accepted for a larger number of Shares than those proposed to be issued, such Tenders will be subject to a *pro rata* diminution.

Every Purchaser will be required, on notice being given of the acceptance of his Tender, forthwith to pay to the Company the full Price of the Shares sold to him, including any premium; and if from any cause whatever such Price shall not be paid on or before the 18th day of June next, interest at 10 per cent. shall be paid thereon from that date until payment.

The Registered Holders of the Shares now sold will be entitled to Dividend from the date of payment for same.

Forms of Tender can be obtained personally or by letter from the Offices of the Company.

By order of the Board of Directors,
ROBT. DOUGLAS JESTY,
Secretary.

Offices of the Company,
5, Sea Road, Bexhill-on-Sea.

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DR. ROSTIN'S APPARATUS.
Largest Installations in the World.
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Rich in Illuminating Power and Yield of Gas.
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AND
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Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

MIRFIELD GAS COAL.
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